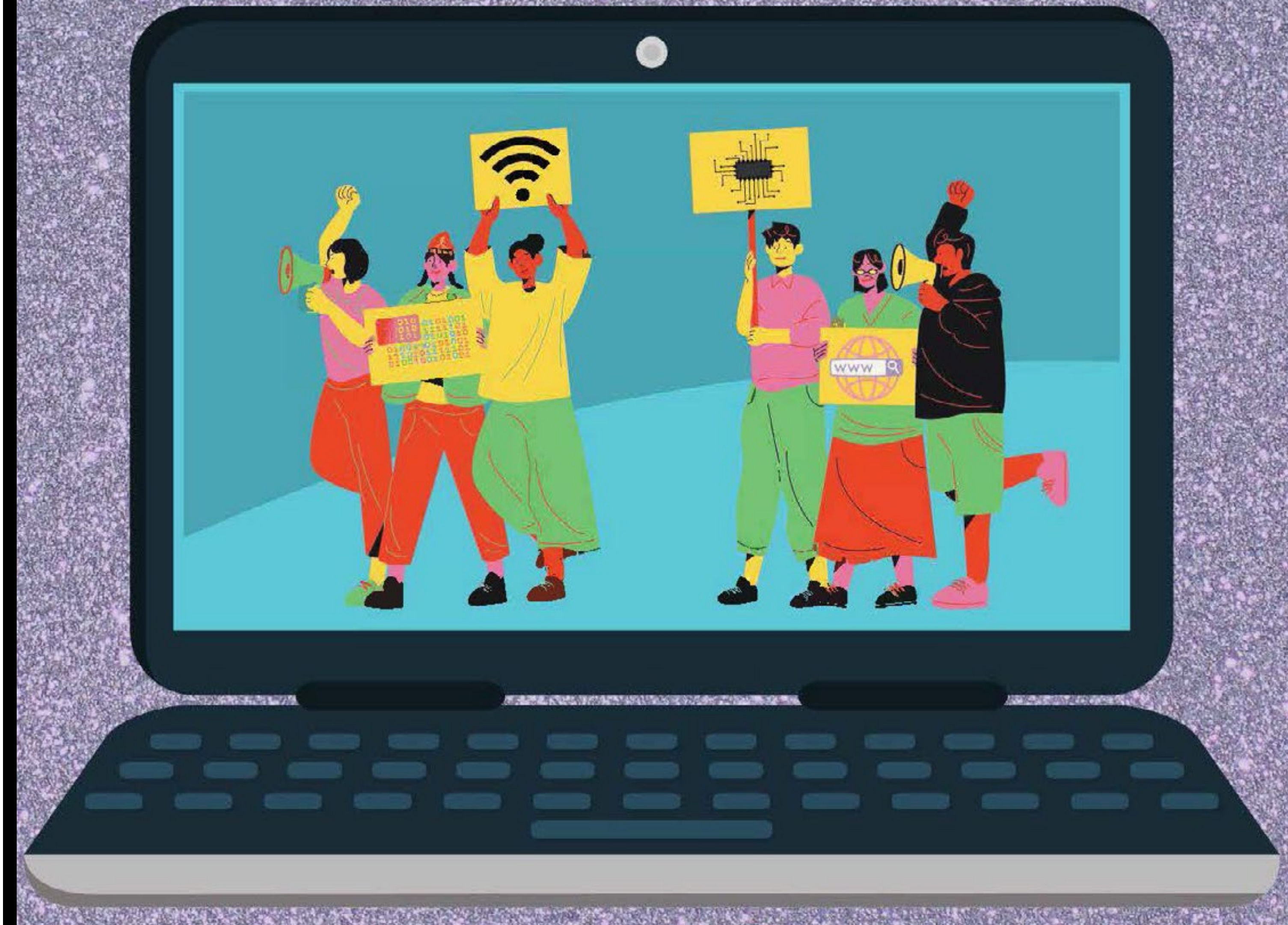
STC

November 2022
Volume 69 Number 4

Technical COMMUNICATION

Journal of the Society for Technical Communication

Investigating Advocacy in Technical Communication



Technical
COMMUNICATION
Journal of the Society for Technical Communication

Technical Communication (ISSN 0049-3155, permit 0763-740) is published quarterly by the Society for Technical Communication, a nonprofit educational organization, 3251 Old Lee Highway, Suite 406, Fairfax, VA 22030, USA. Periodicals postage paid at Fairfax, VA 22030, USA, and at additional mailing offices. Canada Post Agreement Number 40045946. Send change of address information and blocks of undeliverable copies to P.O. 1051, Fort Erie, ON 12A 6C7, Canada.

POSTMASTER: Send address changes to Technical Communication, 3251 Old Lee Highway, Suite 406, Fairfax, VA 22030, USA. Printed in the USA.

CHANGES OF ADDRESS AND CORRESPONDENCE: Notification of change of address for both STC members and nonmember subscribers should be sent to the STC office. Nonmember subscription rates (print version): $400 USD per year, $420 USD in Canada, ($440 USD overseas). Individual issues may be purchased from the Society office for $40 while supplies last.

Statement of Ownership: There were 130 copies of TECHNICAL COMMUNICATION published in August 2022. The average for the preceding 12 months was 138. The paid/requested outside-county mail subscriptions for the August 2022 issue were 82; the average for the preceding 12 months was 84. Total distribution for August 2022 was 83. The average for the preceding 12 months was 87. Twelve (12) free copies of TECHNICAL COMMUNICATION were distributed by mail in August 2022 and the average number of free copies distributed during the preceding 12 months was 48. Forty (40) copies of TECHNICAL COMMUNICATION were not distributed in August 2022, and the average number of copies not distributed during the preceding 12 months was 48. The percent paid/requested circulation in August 2022 was 97 percent; for the preceding 12 months, percent paid/requested circulation was 93 percent.

What is a technical communicator? Technical communicators develop and design instructional and informational tools needed to ensure safe, appropriate, and effective use of science and technology, intellectual property, and manufactured products and services. Technical communicators combine multimedia knowledge and strong communication skills with technical expertise to provide education across the entire spectrum of users' abilities, technical experience, and visual and auditory capabilities. For more information visit www.stc.org/about-stc/defining-technical-communication.

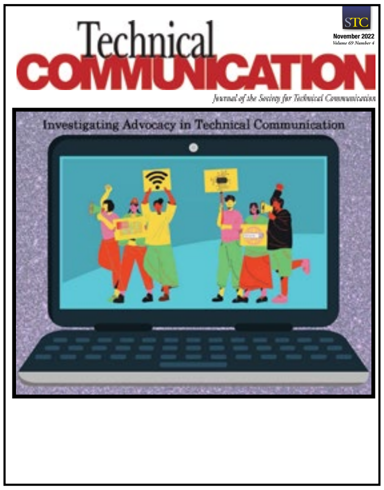
The Society for Technical Communication is the largest association of technical communicators in the world. STC is currently classifying the Body of Knowledge for the field and communicating the value of technical communication. Its volunteer leadership continues to work with government bodies and standards organizations to increase awareness and accurate perception of technical communication. Membership is open to all with an interest in technical communication. Visit the STC website (www.stc.org) for details on membership categories, fees, and benefits.

VOLUME 69, NUMBER 4
November 2022
ISSN 0049-3155

Technical COMMUNICATION

NOVEMBER 2022
Journal of the Society for Technical Communication

ARTICLES



DEPARTMENTS

ONLINE ONLY
TECHCOMM.STC.ORG

STC OFFICE 3251 Old Lee Highway, Suite 406 Fairfax, VA 22030 +1 (703) 522-4114 stc@stc.org

INSTRUCTIONS FOR AUTHORS

About the Journal

Technical Communication is a peer-reviewed, quarterly journal published by the Society for Technical Communication (STC). It is aimed at an audience of technical communication practitioners and academics. The journal's goal is to contribute to the body of knowledge of the field of technical communication from a multidisciplinary perspective, with special emphasis on the combination of academic rigor and practical relevance.

Technical Communication publishes articles in five categories:

- Applied research – reports of practically relevant (empirical or analytical) research
- Applied theory – original contributions to technical communication theory
- Case history – reports on solutions to technical communication problems
- Tutorial – instructions on processes or procedures that respond to new developments, insights, laws, standards, requirements, or technologies
- Bibliography – reviews of relevant research or bibliographic essays

The purpose of *Technical Communication* is to inform, not impress. Write in a clear, informal style, avoiding jargon and acronyms. Use the first person and active voice. Avoid language that might be considered sexist, and write with the journal's international audience in mind.

Our authority on spelling and usage is *The American Heritage Dictionary,* 4th edition; on punctuation, format, and citation style, the Publication Manual of the American Psychological Association, 6th edition.

Manuscript Preparation and Submission

Submitting a manuscript to *Technical Communication* for review and possible publication implies that its submission has been approved by all authors, researchers, and/or organizations involved, that the manuscript (or a substantial portion) has not been published before, and that the manuscript is not under review elsewhere.

When using previously published materials (for example, images or text excerpts), authors are responsible for obtaining the permissions needed to reprint copyrighted materials.

The typical article length is between 5,000 and 8,000 words. Exceptions are possible.

Use up to three levels of headings, and indicate them clearly. Do not number headings of sections and subsections.

FIRST-LEVEL HEADING
(all caps, on a line by itself)

Second-level Heading
(each word capitalized, bold, on a line by itself)

Third-level heading
(first word only capitalized, bold, on a line by itself)

Except for the cover page, remove all identifying information from the manuscript. This includes author names, author affiliations, acknowledgments, and references to work in progress or unpublished manuscripts.

Do not use footnotes. Instead, use author-date citations within the text, and provide a complete list of works cited (labeled "References"). Avoid multiple citations for ideas or approaches unless they demonstrate an evolution in thought or practice.

Check all author-date citations within the text and all entries in the reference list for both accuracy and conformance to the Publication Manual of the American Psychological Association (APA), 7th edition, chapters 9 and 10.

Submit your manuscript as a double-spaced electronic file with one-inch margins. Do not attempt to mimic the format or layout of a published article. Keep the layout as clean and simple as possible.

Microsoft Word files are preferred. If you use another word processor, a Rich Text Format (RTF) file is also acceptable. Organize your manuscript as follows:

- Page 1: Cover page – Title of the manuscript, a running head, and the names, affiliations, and contact info of all authors
- Page 2: Structured abstract – A summary of the article (maximum 250 words), using the headings "Purpose," "Method," "Results," and "Conclusion"
- Page 3: Up to five keywords and a practitioner's takeaway (maximum 100 words) displayed as a bulleted list summarizing the practical implications of the article
- Page 4: Start of the manuscript
- References
- Tables and figures – Start each table or figure on a new page. Assign each table and figure a number and title. If a manuscript is accepted for publication, provide high-resolution images.

Send the manuscript as an attachment to an e-mail message to the editor-in-chief at tceditor@stc.org.

Review Process

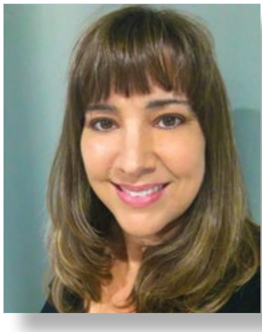
The editor-in-chief will read your manuscript and check its potential suitability for the journal. In the case of a positive outcome, the manuscript will be sent to three independent referees for a double-masked review. On the basis of the referees' recommendations, the editor will send you a decision about the manuscript: accept, accept with revisions, revise and resubmit, or reject. The review criteria are listed at www.stc.org/techcomm/instructions-for-authors/.

Copyrights

STC requires that authors transfer copyrights to STC for articles appearing in Technical Communication and grant STC permission to post the articles on Technical Communication Online for an indefinite period. STC will grant colleges, universities, and libraries the right to use the articles free of charge for educational purposes.

Dr. Amber Lancaster and Dr. Carie S. T. King

Localized Usability and Agency in Design: Whose Voice Are We Advocating?



By Dr. Amber Lancaster and Dr. Carie S. T. King

Technical communication (TC) is a field that embraces forward thinking, discipline expansion, and community engagement. As such, recent TC scholarship has highlighted a shift in what it means to localize information products (i.e., design and interaction, interface and functionality, personalization and customization, media forms and communication messages, etc.). In her 1995 book *International Technical Communication: How to Export Information about High Technology*, Nancy Hoft defines localization as "creating or adapting an information product for use in a specific target country or specific target market" (p. 11). Almost three decades later, TC continues localizing to make information products' use for one group work for others in international local contexts, but our field recognizes a change in how and why and for whom we localize.

Globalization creates an ongoing need for TC to localize information products. As Sun and Getto (2017) note, "The design, implementation, evaluation, distribution, and consumption of information products and services happen more often on a global level. In a globalized economy, the ultimate value of a product or service depends on its global success" (p. 89). However, globalization introduces many challenges for localizing information products: e.g., cultural differences, user group diversity, technology use and constraint variances, and accessibility and ability statuses. Consequently, designing for global success and localizing information products with focus on user experience (UX) may inadvertently target majority user groups and exclude those who do not "fit" the target market or that conflict with some users' needs. The globalization challenge we face, then, is designing localized inclusive information products.

This special issue focuses on the challenges for localization with usability and UX in mind and explores our field's changing practices in *how* and *why* and for *whom* we localize. Our special issue CFP reflected personal and professional experiences and observations. We saw and experienced the so-often disconnect between the design of information products and their users. Amber was raised in a blue-collar home of an automotive factory worker and had close ties to a disastrous factory explosion when workers' voices were excluded in design processes (documented in Lancaster, 2018). Carie is the daughter/dependent of an U.S. Air Force officer who was stationed in more than one country, and she experienced intercultural adjustments and challenges of design for a particular user population to which she did not belong. Our personal and professional lives intersect at UX: our lived experiences, scholarship, and consulting work have related to design issues and we desire to enhance information products for others. We see a growing need in TC to advocate for others and to design with greater user agency.

We recognize that a design approach of "one size fits all" often excludes the many voices of diverse user groups and that designers should explore how users fit into a larger global population. But we also recognize that design decisions are complex, requiring reconciliation, compassion, empathy, and acceptance by both designer and user to ensure that the information product embraces a more balanced design. We connect design balance to the idea of *equilibrium*—"a state of intellectual or emotional balance" and "a state of adjustment between opposing or divergent influences or elements" ("equilibrium," n.d.)—and call for UX that considers agency for change as well as the unique

Localized Usability and Agency in Design: Whose Voice Are We Advocating?

interacting influences that shape design.

The application of equilibrium to TC allows designers and diverse users to respect others, give the benefit of the doubt in design, and consider expanding the territory of users in a more global community. It also encourages communication, evaluation, interaction, and transparent feedback to *further* develop products, even after launch. Applying equilibrium to TC—and specifically design, UX, inclusion, agency, and advocacy—rather than giving one user group a priority, designers should seek to expand localization and rethink how users fit into a global population.

As we noted in our CFP (Lancaster & King, 2022), recent TC scholarship has called for technical communicators to critically evaluate usability methods because of many, often contentious, social issues and a growing global environment. The field is expanding its considerations and interdisciplinarity; some recent studies (in the past six years) included articles about:

- cultural sensitivity (e.g., Sun & Getto, 2017; Walwema, 2016)
- voter registration and minority voting (e.g., Jones & Williams, 2018; Pryor, 2017)
- environmental design (e.g., Sackey, 2020)
- accessibility (e.g., Hitt, 2018)
- social justice (e.g., Shirley, 2019)
- participatory culture (e.g., Arduser, 2018; Breuch, 2018).

In our CFP, we asked, "How do [designers] strike a balance in representing all voices in the design process? How do they determine whose voices to advocate for?" and we called for research in TC "that explores how our field might expand localized usability to examine how variables depend on, connect with, and contend with each other to maintain a state of balance in UX" (Lancaster & King, 2022).

Shifting in *how* and *why* and for *whom* we localize allows TC to embrace unique research methods and design principles for designing for diverse users—per age, gender, ethnicity, culture, education, etc.—particularly because users differ across cultures (Acharya, 2018). Adding to this, a shift in industry includes considering usability as an interactive experience that is highly personalized/customized: in other words, different tools and processes need to interact and adapt in real time for lifestyle, health, medical care, fitness, and other human experiences and needs. We also see increased use of AI to aid in those personalized/customized technology experiences. And we see greater reliance on the individual's engagement with the tools to ensure personalization/customization. As a result, technical communicators are left to consider so many user variables in the design and UX process. By engaging users in participatory design and as "co-designers" (Bannon & Ehn, 2013; Stephens & DeLorme, 2019; Zachry & Spyridakis, 2016), TC has attempted to address designing for diverse users, but we wonder—what more can we do?

In our own work, we have considered diversity in consulting parties, creating transdisciplinary usability testing to consider different perspectives and needs (Lancaster & Yeats, 2016). We have also considered different prototyping methods (Andrews et al., 2012; Lancaster, 2008) that allow designers to consider localization, user agency, and social justice in addressing users' needs and expectations and thus to personalize designs. We have studied diverse populations to learn about their perspectives (e.g., King, 2017—medical rhetoric; Lancaster, 2018—risk communication) to note how they address their priorities and seek to express their agency, particularly when decision makers are not "listening." And we too have examined user groups that have not been considered in the design and implementation of tools (King et al., 2018; Lancaster, 2006). However, we see where more work in our field is needed to advocate for others and to design with (and for) increased user agency.

Thus, this special issue called on authors to consider agency for change but also to share the unique interacting influences and considerations that are shaping design. Authors submitted summaries of their innovative research methods and design practices through which they are encouraging inclusive change and *balance*. This balance in design requires "give and take"—i.e., designers consider potential users' responses and anticipate counter responses to design for a larger and broader user population.

For this special issue, we invited submissions that addressed recent research related to localization, usability, UX, advocacy, and agency but watched for proposals that welcomed broader inclusion in user identity. We were

overwhelmed by the response. Research proposals poured in; proposals were diverse and well thought out. In considering what proposed manuscripts to include, we sought originality in thinking with a focus on empathy and a mindset of unifying users but also on helping to solve the complex design challenges our field faces for localizing information products. We also looked for methods that can serve as examples that future scholars can study, use, and adapt.

From an exciting and large pool of strong and relevant submissions that underwent anonymized peer review, we chose seven articles that provide innovative approaches to TC and that consider balance of voices.

In **"Understanding Agency through Testimonios: An Indigenous Approach to UX Research,"** Nora Rivera frames her research through a scholar's lens but with valuable "insider" knowledge and perspective to present Indigenous *testimonios*—responses to prompts and narratives that include users' experiences but with a collective, community-focused voice. She also shares how Indigenous interpreters and translators in medicine, law, education, and industry exercise their personal agency while also sharing community "pain points" and calling for social change. Rivera's research makes readers aware of cultural values and communication patterns and about their collective challenges in Westernized systems, benefiting the systems, the technical communicators, and the Indigenous individuals and communities whose stories and calls for social change are valuable to develop systems that balance all voices.

Brett Oppegaard and Michael Rabby's **"Gamifying Good Deeds: Values in Play during a Descriptathon and Beyond"** considers Descriptathons, focusing on shifted design for Descriptathon 8 (D8). They provide the philosophy, ongoing challenges, and research from the latest event, established to create Audio Descriptions of print and digital media for users who are blind or low vision so users can experience the content of visual elements. D8 demonstrated the evolution of the organizers' thinking, including a gamified event that encouraged participants—those who benefit from the Audio Descriptions and also those who want to participate for service and the challenge of the event—to collaborate and engage. The beauty of the Descriptathon is that it calls participants who are and who are not blind or low vision, all who value accessibility, to engage in creating more accessible content and addresses their other values in the construct of the event.

In **"Exploring Localized Usability Implementation in mHealth App Design for Healthcare Practitioners in the Global South Context: A Case Study,"** Keshab Acharya challenges Global North (GN) designers to design apps, specifically medical and health apps like the Medscape app, with global users, including Global South (GS) users, in mind. Keshab surveyed and interviewed healthcare practitioners (including medical students) in Nepal about their experiences using the Medscape app and learned about many of the concerns and issues that GS practitioners might experience. Developers should consult with GS users and address localized needs and expectations and also apply persuasive design concepts for localized usability for GS users. Regional accessibility needs to be considered—so users in low-bandwidth areas can access the information. Designing these apps with GS users in mind increases the global use of the tool and also indirectly improves the healthcare of residents who receive care from the app users.

In **"Everyone is Always Aging: Glocalizing Digital Experiences by Considering the Oldest Cohort of Users,"** Allegra Smith reminds readers that everyone is aging and focuses her research (using task-analysis methods) on the 75+-age user group. She observes that users were unable to complete what some consider basic tasks, including finding information about income taxes, changing their browser homepage, and mapping the distance between two locations in their vicinity. She notes that usability for an aging population requires glocalization and participatory design—as she writes, "designing for them and alongside them—for technology." Through her research, she establishes balance in voices by studying a frequently overlooked population, expands the usability considerations of tools by setting her eyes on the future of every user, and calls designers to empathetic design for the ever-aging user population.

Risk messaging is a focus in **"Do Voices Really Make a Difference? Investigating the Value of Local Video Narratives in Risk Perceptions and Attitudes**

Localized Usability and Agency in Design: Whose Voice Are We Advocating?

toward Sea-Level Rise" by Daniel Richards and Sonia Stephens. They share findings from an empirical study to localize and improve risk messaging, specifically related to sea-level rise (SLR) and flooding. Surveying more than 100 participants and then conducting follow-up focus groups, the authors ask if video storytelling or textual storytelling is more effective in TC for local users. Their research demonstrates that localized stories are compelling, and both video and text were effective modalities in their research. In this way, they demonstrate an emphasis on improving safety measures for residents in coastal regions—research that is applicable to areas around the world that are susceptible to SLR and flooding. Their research goes beyond information and empathetically urges technical communicators to act: to research further and apply effective design to inform residents in coastal areas.

Guiseppi Getto and Suzan Flanagan also focus their research on safety in **"Localizing UX Advocacy and Accountability: A Lean Workflow that Amplifies User Agency."** They address their observations of a Lean workflow in creating SeaMe, an app for boaters to use for recreational boating safety, and they establish the importance of involving boaters, who use the app for communication and navigation, as well as Boating Law Administrators, who use the app to track and find missing boaters (for safety assurance). Getto and Flanagan interviewed 141 potential stakeholders to design the app; they share personas that they created in the research process. The app then is developed with features to accommodate multiple groups' (boaters' *and* organizations') needs. Without user input, with boaters having user agency, users' needs will be overlooked and they will not adopt the tool. The authors emphasize connecting with multiple stakeholders (and thus users) to balance voices and benefit boaters as well as administrators and emergency rescue services.

In a different thread, Daniel Hocutt, Nupoor Ranade, and Gustav Verhulsdonck share **"Localizing Content: The Roles of Technical & Professional Communicators and Machine Learning in Personalized Chatbot Responses."** They challenge technical communicators to become more tech savvy in understanding how AI, machine learning (ML), chatbots, and other TC work to interact with users. Considering microcontent from Meena, an AI-driven chatbot that uses natural language processing to respond to users, the authors explain how technology is being developed to engage users, to anticipate what users want and need, and to personalize data (responses to searches) that are being pushed to users. The personalized content from AI-assisted technology is localized: users' locations and previous content and requests are used in customizing the responses. The authors acknowledge that effective construct of language and structure of AI-driven tools requires that technical communicators consider global users to create personalized responses with accurate, effective, and efficient content. Technical communicators and TC instructors are challenged to integrate assemblages of the actors—users, AI, content, and metrics—into student learning outcomes for future technical communicators.

ABOUT THE GUEST EDITORS

Dr. Amber Lancaster is an associate professor of communication, director of professional writing (PWR) at Oregon Tech, and associate editor for *Communication Design Quarterly*. She has extensive experience in usability testing and client-based research projects as both academic and consultant/contractor. Amber started the mobile usability lab at Oregon Tech and previously worked in the user research lab at Texas Tech. She administers usability research for corporate and academic clients and teaches user research, usability testing, risk communication, and technical writing. Her publications in usability include manuscripts on prototyping methods, distributed usability, social issues in UX, and transdisciplinary research models in UX. Her research focuses on the intersections of user centered design (UCD), ethics, and social issues as well as on technology and writing pedagogy. She has published in *Technical Communication*, *IEEE Transactions on Professional Communication*, *International Journal of Sociotechnology and Knowledge Development*, and *Intercom*. Her forthcoming work includes a special issue of *Programmatic Perspectives*, a special issue of *IEEE Transactions on Professional Communication*, and an

edited book collection with SUNY Press.

Dr. Carie S. T. King is a clinical professor and associate director of rhetoric at The University of Texas at Dallas (UTD) and managing editor of publications for Sigma Tau Delta. She is also co-founder and partner in a communication consulting firm that works with international professionals to help them effectively communicate in globalized industries. Her background is in medical editing and clinical research, specializing in TC and ethics. Recently awarded UTD's President's Award for Excellence in Online/Hybrid Teaching, Carie works with graduate instructors and teaches a diverse load, including classes in rhetoric, intercultural communication, and usability. She is collaborating (COIL) with two instructors from Japanese universities each summer. She created and implemented the first usability course for the UX and game-design programs at UTD. Carie integrates UCD in her curriculum and researches pedagogy, usability, and ethics. Her monograph, *The Rhetoric of Breast Cancer: Patient-to-patient Discourse in an Online Community*, is published with Lexington Health Series; her work has also been published in *International Journal of Intercultural Relations*, *Health Communication*, and *Journal of Technical Writing and Communication*, with forthcoming work including a special issue of *Programmatic Perspectives* and an edited book collection with SUNY Press.

REFERENCES

Acharya, K. R. (2018). Usability for user empowerment: Promoting social justice and human rights through localized UX design. In *Proceedings of the 36th ACM International Conference on the Design of Communication*. ACM. https://doi.org/10.1145/3233756.3233960

Andrews, C., Burleson, D., Dunks, K., Elmore, K., Lambert, C. S., Oppegaard, B., Pohland, E. E., Saad, D., Scharer, J. S., Wery, R. L., Wesley, M., & Zobel, G. (2012). A new method in user-centered design: Collaborative prototype design process (CPDP). *Journal of Technical Writing and Communication, 42*(2), 123–142. https://doi.org/10.2190/TW.42.2.c

Arduser, L. (2018). Impatient patients: A DIY usability approach in diabetes wearable technologies. *Communication Design Quarterly, 5*(4), 31–39. https://doi.org/10.1145/3188387.3188390

Bannon, L. J., & Ehn, P. (2013). Design matters in participatory design. In J. Simonsen & T. Robertson (Eds.), *Routledge handbook of participatory design* (pp. 37–63). Routledge.

Breuch, L. K. (2018, July 22–25). From research to practice: How insights from social Web research inform Website usability [Extended abstract]. 2018 IEEE International Professional Communication Conference. 16–17. https://doi.org/10.1109/ProComm.2018.00010

Equilibrium. (n.d.). Merriam-Webster.com Dictionary. Retrieved from https://www.merriamwebster.com/dictionary/equilibrium

Hitt, A. (2018). Foregrounding accessibility through (inclusive) universal design in professional communication curricula. *Business and Professional Communication Quarterly, 81*(1), 52–65. https://doi.org/10.1177/2329490617739884

Hoft, N. L. (1995). *International technical communication: How to export information about high technology*. John Wiley & Sons.

Jones, N. N., & Williams, M. F. (2018). Technologies of disenfranchisement: Literacy tests and Black voters in the US from 1890 to 1965. *Technical Communication, 65*(4), 371–386.

King, C. S. T. (2017). *The rhetoric of breast cancer: Patient-to-patient discourse in an online community.* Lexington.

King, C. S. T., Bivens, K. M., Pumroy, E., Rauch, S., & Koerber, A. (2018). IRB problems and solutions in health communication research. *Health Communication, 33*(7), 907–916.

Lancaster, A. L. (2008). *Usability evaluation methods: A comparative study of low-fidelity & high-fidelity prototyping* [Unpublished doctoral dissertation]. Texas Tech University.

Lancaster, A. (2006). Rethinking of use of humanistic aspects: Effects of technical information beyond the intended audience. *Technical Communication, 53*(2), 212–224.

Lancaster, A. (2018). Identifying risk communication deficiencies: Merging distributed usability, integrated scope, and ethics of care. *Technical Communication, 65*(3), 247–264.

Lancaster, A., & King, C. S. T. (2022). Call for papers: Special issue of *Technical Communication* on “Localized usability and agency in design: Investigating advocacy in technical communication.” *Technical Communication.* https://www.stc.org/notebook/2021/08/12/call-for-papers-special-issue-of-technical-communication-on-localized-usability-and-agency-in-design-investigating-advocacy-in-technical-communication

Lancaster, A., & Yeats, D. (2016). Establishing academic-industry partnerships: A transdisciplinary research model for distributed usability testing. *International Journal of Sociotechnology and Knowledge Development, 8*(3), 29–45.

Pryor, L. (2017). Designing for a culturally inclusive democracy: A case study of voter registration outreach postcards in Latino communities. *Technical Communication, 64*(2), 154–165.

Sackey, D. J. (2020). One-size-fits-none: A heuristic for proactive value sensitive environmental design. *Technical Communication Quarterly, 29*(1), 33–48. https://doi.org/10.1080/10572252.2019.1634767

Shirley, B. (2019). Working toward social justice by engaging other disciplines in engaging communities: A technical communication scholar’s role. In *Proceedings for 2019 CPTSC Annual Conference*. http://2019conference.cptsc.org/wpcontent/uploads/sites/4/2019/10/2019-Program_updated_12SEPT19.pdf

Stephens, S. H., & DeLorme, D. E. (2019). A framework for user agency during development of interactive risk visualization tools. *Technical Communication Quarterly, 28*(4), 391–406.

Sun, H., & Getto, G. (Eds.) (2017). Localizing user experience: Strategies, practices, and techniques for culturally sensitive design [Special section]. *Technical Communication, 64*(2), 89–94.

Walwema, J. (2016). Tailoring information and communication design to diverse international and intercultural audiences: How culturally sensitive ICD improves online market penetration. *Technical Communication, 63*(1), 38–52.

Zachry, M., & Spyridakis, J. H. (2016). Human-centered design and the field of technical communication. *Journal of Technical Writing and Communication, 46*(4), 392–401. https://doi.org/10.1177/0047281616653497

On the Cover

ARTIST'S NOTE

For this project, I decided to design a cover for the topic of "Investigating Advocacy in Technical Communication." My design depicts a computer screen with a group of people protesting with signs. These signs all contain images that are representative of technology and the internet. I am attempting to convey the idea of using technology and the Internet for advocacy. I feel that showing the advocacy happening on a computer screen communicates the topic quite well, along with the content of their signs being related to technology and the Internet.

ABOUT THE ARTIST

Samuel Woods is an undergraduate student at Eastern Kentucky University, where he is studying English. He is also pursuing a certificate in professional and technical writing, which encompasses learning fundamental writing and communication skills, advanced visual design skills, international business communication approaches, and successful job search strategies. He is very passionate about the arts, specifically literature, design, and music. He is available at samuel_woods52@mymail.eku.edu.

Understanding Agency Through Testimonios: An Indigenous Approach to UX Research

doi: https://doi.org/10.55177/tc986798

By Nora K. Rivera

ABSTRACT

Purpose: This article presents a UX study conducted during a roundtable collaborative event with Indigenous interpreters and translators. The work highlights the value of Indigenous testimonios as a UX method for gathering narratives that trace a user's experience through a collective voice. Testimonios also trace users' social and cultural contexts while prompting participants to exercise their agency and promote social change.

Method: This UX study engages Indigenous testimonios as a primary method. Mapping testimonios allows researchers to explore a participant's narrative arc that begins with a personal experience that links a collective struggle resulting from a system of oppression and ends with a call for social change.

Results: Using testimonios as a UX method yielded data that traced individual and collective pain points that defined the critical issues with which Indigenous interpreters and translators grapple and emphasized their civic engagement, amplifying their agency through a method situated in their contexts. This work also highlights *dialogue* and *desahogo*, or emotional relief, as key elements of testimonios shared in a collective setting. This study shows that Indigenous interpreters and translators, as technical communicators, are foremost community activists.

Conclusion: A testimonio method prompts participants to reflect on issues at a deeper level through narratives and dialogue. It also engages the unique differences of participants while revealing general similarities. Testimonios can ultimately help design content, products, and processes that better align with the unique contexts of Indigenous individuals and other underrepresented groups who express their needs in a collective manner.

KEYWORDS: Testimonios, Indigenous methods, Indigenous interpreters and translators, UX research, Technical communication

Practitioner's Takeaway

- Testimonios are a valuable tool to design UX projects with individuals from underrepresented groups who express their needs as collective needs.
- This method can help practitioners understand important cultural and contextual differences when working with superdiversified (Cardinal, 2022) groups.
- The personal and collective narratives prompt participants to reflect on issues at a deeper level, engaging with their unique differences while revealing general similarities.
- Practitioners must invest time to build a relationship with participants when working with testimonios.
- Practitioners must view this methodology from an Indigenous lens, especially when working with the unique elements of *desahogo*, or emotional relief, and dialogue.

INTRODUCTION

Societies in the Americas have always been multicultural and multilingual. Before Europeans arrived in the Americas, the people on the continents spoke approximately 1,500 languages (Campbell & Mithun, 1998). Many languages were lost after colonization, and many have mutated into variants that today are treated as autonomous languages. In Mexico alone, 364 Indigenous linguistic variants exist today (INALI, 2008). As a result, Indigenous interpreters and translators have been essential for intercultural communication. Evidence shows that *written* translation took place as early as the 1st century between Nahua and Maya, as seen in the Mayan ceramic vessel found in Rio Azul, Guatemala, which is encircled with Nahua words in Mayan glyphs to describe the preparation of cacao (Macri, 2005). During the Spanish colony, moreover, Indigenous *oral* interpreters held government positions in Mexico and the Araucanian region (modern Chile) to help mediate between languages and cultures (Alonso & Payás, 2008). Language mediation in Indigenous languages in the Americas has been present for thousands of years.

Unsurprisingly, the complexities associated with interpreting and translating between two different worldviews (Indigenous and Western European) have triggered layers of difficulties for Indigenous interpreters and translators as technical communicators working in the legal, medical, and educational fields. As they mediate between languages, cultures, values, loyalties, and biases, Indigenous translators and interpreters continue to grapple with the Western systems that guard public institutions throughout the Americas today.

This study analyzes the experiences of Indigenous interpreters and translators through the Indigenous method of *testimonios* to identify the critical issues affecting them in their role as technical communicators. Testimonios are narratives that emphasize an individual's wholistic relationship with a product, service, process, or content. Through a testimonio, an individual narrates a wholistic experience that links a personal account to the collective experience of the community to which the individual belongs, which yields valuable information to examine the cultural and social roots of an issue. In other words, this method yields information about the user's full experience, hence the value of testimonios to UX research.

Testimonios differ from interviews in several ways. Instead of the researcher asking one question at a time, as in the case of interviews, testimonios draw on dialogue that seeks to understand the perspective of a group of people. Instead of using open-ended questions, testimonios use prompts to encourage individuals to tell their experiences through stories. Testimonio prompts are open enough to stimulate storytelling and dialogue between individuals sharing their experiences so that, in a roundtable setting, each participant becomes both the storyteller and audience. Rather than asking demographic questions, a testimonio prompt might ask, "what can you tell me about your background?" Instead of asking, "what specific feature of this product do you like the most?" a testimonio prompt might ask, "what can you tell me about your experiences with this product?" In many cases, the researcher participates in the dialogue by acknowledging what the participants share, asking clarifying questions, or introducing more prompts. Ultimately, the narrative of a testimonio reveals the cultural and social contexts of the challenges and motivations of a user. Testimonios are narratives that construct, and reconstruct (Mora Curriao, 2007), a personal account that embodies a shared collective experience.

This article demonstrates how an individual's account can also represent the experiences of a community to identify the issues of a group. Because most testimonios produce a call for civic engagement (Delgado et al., 2012), testimonios can be a powerful method to define the issues affecting underrepresented groups while amplifying agency. Whereas UX designers do not often use this method, testimonios are gaining ground in the UX adjacent field of technical communication (TC), particularly through the work of Latinx practitioners and scholars working with Latinx communities (Gonzales et al., 2020; Medina, 2018; Phillips & Deleon, 2022; Rivera & Gonzales, 2021). This study aims at answering the following questions:

- How can testimonios help identify the issues affecting Indigenous interpreters and translators in their role as technical communicators working in the legal, medical, and educational fields?
- How might UX researchers engage with testimonios as an Indigenous method that promotes agency and supports user advocacy?

This study highlights the value of testimonios as an Indigenous approach to UX research that increases

user agency and supports self-advocacy. This study also discusses how testimonios conducted in a roundtable setting can help build community, or connections, between individuals from diverse cultural backgrounds and between practitioners and academics. Most importantly, this work helps to design more meaningful experiences for Indigenous professionals.

Although Indigenous individuals might not be the core audience of most technical communicators working in UX design, this study can help identify meaningful strategies that better engage Indigenous users. Furthermore, understanding the complexities enveloping cultural identities can help technical communicators identify their audiences with more precision and, therefore, design more meaningful experiences for diverse users.

WORKING DEFINITIONS OF CULTURAL IDENTITIES

Designing experiences for multicultural and multilingual audiences today require not just empathy but a deep comprehension of the various cultural contexts informing their views and preferences. As immigrants from Latin America and the Caribbean become more visible in the US, it is crucial to understand the nuances between the various identities that make, according to the United States Census Bureau (Vespa et al., 2020), the largest immigrant combined group in the United States (US) and the fastest-growing demographic group. Cardinal (2022) argued that global migration has increased the complexities associated with cultural identities, exposing an in-flux "diversification of diversities" phenomenon known as *superdiversity* (p. 2). Superdiversities have always been present in the Americas, but they have not always been visible in the US. For example, the term Hispanic is used in most public institutions in the US to identify all individuals with Latin American heritage without weighing the differences between Indigenous individuals from Mexico and Mexican Mestizas/Mestizos and Mexican Americas, or Mexicans and Puerto Ricans, or Colombians and Peruvians. We are all lumped in the same Hispanic category whether we speak Spanish or not. The term Hispanic implies a Spanish cultural and linguistic heritage that leaves out heritages of Indigenous and Afro-descendant individuals.

Although this work focuses on the experiences of Indigenous individuals, other ethnic and cultural identities also contextualize this study and, therefore, require some clarification, with the understanding that this list in no way intends to cover the full extent of the many cultures that individuals and groups with Latin American heritage represent in and outside the US.

- *Indigenous*. This is the most generally accepted term to refer to individuals who self-identify as Indigenous and are recognized and accepted by an Indigenous community (UN, 1982). Although the term is complex and does not universally describe all individuals of Indigenous heritage, individuals who belong to Indigenous communities in this study self-identified with this term. Some Indigenous individuals in the US with Latin American heritage may also self-identify as Latinx. Others with Mexican heritage may also self-identify as Chicanxs, and those with African heritage may also self-identify as Afro Indigenous.
- *Mestiza* (for female), *Mestizo* (for male), *Mestizx/Mestiz@/Mestize* (gender-inclusive neologisms). During colonial Mexico, Spaniards used the terms Mestiza and Mestizo to define individuals with both Spanish and Indigenous ancestry. However, these terms have come to signify individuals of mixed race who favor the Western traditions and practices inherited from the Spanish colonial systems (e.g., public schools, public health institutions, and courts). Indigenous individuals from Mexico use these terms to describe non-Indigenous individuals with Mexican heritage. Indigenous individuals from Central America use the terms *Ladina* and *Ladino* to describe Westernized, non-Indigenous individuals (Ladines is not a gender-inclusive neologism commonly used). Most Mestizes in the US self-identify as Latinxs. Not all non-Indigenous individuals with Mexican heritage self-identify as Mestizes; some self-identify as Afro Mexicans or White.
- *Chicana* (for female), *Chicano* (for male), *Chicanx/Chican@* (gender-inclusive neologisms). Many individuals born in the US of Mexican descent self-identify with these highly political terms. These terms emerged from the Chicano Movement (part of the Civil Rights Movement) to convey strong pride in Mexican roots (primarily Mexican Indigenous roots). The Chicanx culture should

be understood as a *new* culture proud to belong in between two cultures, the U.S. Anglo and the Mexican (like the Spanish and Indigenous cultures gave birth to the Mestize culture during the colonial era in Mexico). Additionally, the term Chicana is strongly associated with feminist activism because of the powerful social and political presence that Mexican American feminists have had over the years in and outside academia. Not all U.S.-born Mexican Americans self-identify as Chicanxs. Some Indigenous individuals of Mexican descent self-identify as Chicanxs. Chicanxs may also self-identify as Indigenous, Afro-Latinxs, Mestizes, or Latinxs.

- *Latina* (for female), *Latino* (for male), *Latinx*/*Latine* (gender-inclusive neologisms). The neologism Latinx has become the most generally accepted term in U.S. academic realms to describe individuals with Latin American heritage. Individuals in Latin America, however, are more familiar with the term *Latine*. Some Indigenous individuals may not subscribe to a Latinx identity. Most African descendants with Latin American heritage self-identify as Afrodescendientes (Afro Descendants), Afro Latinxs, or Blacks.

Whereas Latinx is perhaps the most inclusive term today to envelop individuals with Latin American heritage, Latinx individuals are multicultural and very often subscribe to more than one cultural identity. The languages we speak also reflect a superdiversity among Latinx individuals as many of us are multilingual, not just in European languages imposed in the Americas through colonization, like English, Spanish, Portuguese, French, and Dutch, but also in the many Indigenous languages of the Americas.

Indeed, a great deal of hybridity exists in Latin America and the Caribbean, and, therefore, cultural identities do not always relate to race or country of origin. Cultural identities reflect the customs and traditions that an individual or a group prefers, such as the case of Chicanxs who may be born to an Anglo parent but identify with their Mexican roots, or Mestizes whose mixed cultural identities are complex as some may feel more connected to their Indigenous roots whereas others favor their European ancestry. Additionally, cultures change over time, and thus so do cultural identities (Sun, 2012). Geopolitics (political relations influenced by the geographical space) can also quickly alter cultural identities, as has been the case of many White Latin Americans who immigrate to the US and become People of Color (POC) in months.

The nuances of cultural identities are essential to understanding users' motivations and why they might find certain aspects of what technical communicators design more challenging than others. Global historical contexts matter. When working with Indigenous and Latinx groups, for example, going beyond understanding language differences and acknowledging that not all groups can relate to Western systems is key. Although the US became a country independent from Great Britain in the 1700s and most countries in Latin America gained their independence from Spain in the 1800s, Western systems continue to govern the Americas (Quijano, 2000; Rivera Cusicanqui, 1987). By and large, Anglo American traditions regulate public institutions in the US in the same way that the Westernized praxes of Mestizes, Lidinas and Ladinos regulate public institutions in Latin America today, not to mention that Western European languages remain the official languages throughout the Americas.

LITERATURE REVIEW

Cultural identities are key when working with a testimonio methodology, as this study shows. Testimonios stem from the Indigenous oral traditions of dialogue, storytelling, and advice. For example, ancient Nahua *huehuehtlahtolli*, or wise dialogues, consisted of storytelling narratives imbued with advice (León-Portilla, 1991). Testimonios as we understand them today trace back to Rigoberta Menchú's (1984) *I, Rigoberta Menchú: An Indian woman in Guatemala*, where Menchú narrated her experiences as a survivor of the Guatemalan Civil War and provides a glimpse at her community-based practices—critical to understanding Indigenous worldviews.

However, Menchú's way of understanding the world has critics who, by pointing out inaccuracies in her facts, question the validity of testimonios "on the grounds of 'historical inaccuracy,'" ignoring that "the political and collective import of the genre transcends the overreliance on the authority of dominant historical fictions as the determining factor for what is true for all experiences," as Medina (2018, "Storytelling" section) noted. Some critics also question the validity of Menchú's testimonio because a translator mediates the story (Medina). Menchú, a Maya-K'iche' speaker, did not write in Spanish at that

time; therefore, a translator recorded Menchú's oral testimonio and published the book in Spanish. This article displays traces of both the issue of undermining Indigenous practices—like testimonios—and the issue of questioning the validity of a translation or an interpretation when involving Indigenous individuals.

A testimonio is a qualitative method that is more common in Latinx and Latin American contexts (Smith, 2012). As the Latinx population continues to grow in the US, more and more practitioners and academics working with Latinx individuals use this method because it resonates with Latinx and Latin American cultures. The dialogical process of sharing and listening to testimonios produces a thoughtful conversation among participants and researcher(s), which is key to building empathy and trust. For this reason, the scholarship and practices of Chicana and Latina feminists often include this method. In short, testimonios exhibit the following characteristics:

- Reconstruct a lived experience through a narrative (storytelling)
- Link a personal narrative to a group's collective experience
- Acquire a reflective dialogical tone
- Call for civic engagement to produce social change
- May involve *desahogarse* as a cathartic act of releasing distressful sentiments (*desahogo*, a noun, means emotional relief and *desahogarse*, a reflexive verb, is the action of releasing a *desahogo*)

The personal narrative in testimonios constructs and reconstructs a lived personal account that connects to a collective experience (Benmayor, 2012; Mora Curriao, 2007). When sharing testimonios, participants often switch from "I" statements, such as "I experienced. . ." or "When I. . .," to "we" statements, such as "In my community. . ." or "My family and I. . ." Sometimes there is no clear separation between the individual and the collective because our interactions with others influence our personal experiences (Gonzales et al., 2020). Most Latinx and Latin American cultures are collectivists as they emphasize the family or the community over the individual—the welfare of the community is even more important in Indigenous contexts, hence the importance of considering the experiences of the family and community when conducting UX research with Latinx and Indigenous individuals or groups.

Further, because testimonios are not neutral narratives of disconnected narrators, they are political. The narratives have a social and political purpose (Benmayor, 2012). Testimonios increase the participants' visibility and empowerment by allowing them to freely express their attitudes and emotions. As a result, many times testimonios climax in a cathartic *desahogo*, or emotional relief, that prompts participants to arrive at a point of "enough is enough" (Rivera, 2022; Rivera & Gonzales, 2021). Subsequently, participants begin working toward finding solutions to the issues discussed. Phillips and Deleon (2022) called this the "healing discourse" of testimonios because it allows others to listen to the emotional relief of individuals who share their experiences and motivates the group to explore different possibilities toward changing an experience for the better.

In the context of this study, the concept of *desahogo* emerged during the sharing of testimonios, when participants collectively arrived at a point where they had pondered on issues enough to arrive at the conclusion that it was time to act to challenge the issues they struggle with. Some of the participants also brought up the concept of *desahogo* as the emotional cathartic act that Indigenous individuals experience in the presence of an interpreter who speaks their language. Frequently only natives from a specific Indigenous community speak the community language variant, and thus Indigenous individuals for whom interpreters provide a service feel an instant connection with the interpreter. This study discusses *desahogo* as part of the testimonios of the participants and as part of an Indigenous interpreting process when providing services to Indigenous individuals under stressful circumstances while navigating Western systems.

Like the arc of storytelling, a testimonio builds a narrative, then climaxes at its peak with a *desahogo*—usually when participants realize that they have said enough (similar to venting) to finally decompress the narrative by working toward a resolution. Even though storytelling does not necessarily aim at advocating for social justice, storytelling becomes the conduit for testimonios to do so (Medina, 2018). Through testimonios, participants examine issues within a larger social and cultural context and, therefore, are inspired to find solutions that incorporate their own civic engagement to help produce social change.

Nonetheless, testimonios do not intend to find a hasty fix to an issue, especially issues affecting underrepresented groups (Gonzales et al., 2020). They

aim at reflecting on the causes and bringing about a call to action. Unlike interviews, the method of testimonios is a process to a deeper understanding of the causes of complex issues, prompting the participants to contemplate various ways of solving the issues through collective reflection and civic engagement. This can be particularly helpful for UX designers when working with individuals from various cultural backgrounds who might understand a problem differently. "Understanding the gap between our viewpoints," Tuck and Yang (2018) argued, allows individuals from different cultural backgrounds to "work together in contingent collaboration" (p. 2). Promoting action and civic engagement via testimonios increases user agency and, therefore, drives UX designers to a more inclusive multicultural approach to solving problems.

METHOD

To conduct this study, I collaborated with Indigenous individuals with the utmost respect and admiration for their knowledges, from the positionality of a Mestiza who values the common heritage and the shared history. This study aimed to identify the issues affecting Indigenous interpreters and translators as technical communication practitioners and explored ways to professionalize their work. As is the norm in a qualitative testimonio methodology, this study used a small sample size (Benmayor, 2012; Delgado et al., 2012; Gonzales et al., 2020), allowing enough occasion for storytelling, dialogue, and reflection.

Although each participant represented a community with unique traditions, this superdiversified group (as Latinx groups often are) shared very similar experiences in their role as practitioners of Indigenous language mediation, which is the focus of this study. Through testimonios, each participant narrated how the various fields and the geopolitics of the spaces they work in influence their praxes, revealing important differences within the commonalities they shared. The testimonios of this superdiversified group yielded twofold data: 1) the general, shared issues of Indigenous interpreters and translators when navigating Western systems, and 2) the unique issues that each participant, both personally and collectively, faced within the context of the community each represents. Testimonios in this study also yielded data about the civic engagement that each participant takes part in, which is a common practice among professionals who belong to underrepresented groups (e.g., many professionals of color belong to organizations associated with their cultural identity). The value of testimonios lies in the personal-collective twofold data they yield and the civic engagement that leads to a call to social change that increases user agency, thus making testimonio mapping a stronger method for engaging Indigenous populations.

An Indigenous organization, the Centro Profesional Indígena de Defensa y Traducción (CEPIADET), guided this study (IRB/FWA No. 00001224). CEPIADET invited Indigenous and non-Indigenous individuals as well as academics and practitioners to participate in this study to discuss the issues from various cultural and professional perspectives. Pseudonyms were used to protect the privacy of the participants.

The testimonios were shared in a roundtable setting guided by two prepared prompts from where the participants built their narratives. The first prompt was, "Can you tell us your name and your background?" Participants were given about 5 minutes (in both instances) for individual introductions. A protocol of introductions where individuals emphasize their place of origin is also an Indigenous method that helps locate the lens, or perspective of the world, of each participant (Kovach, 2010). Participants each took about 5 minutes (in both instances) to introduce themselves, providing information such as name, place of origin, place where they live now (because some have emigrated to different cities or countries), languages they speak, and the field and place where they work.

After the introductions, participants were given the second prompt, "What can you tell us about the issues you face as an Indigenous interpreter and translator in your community?" Each participant was given a time limit of 15 minutes. As a general guideline, they were also informed that they could ask questions and make comments after each contribution. During each contribution, the rest of the participants listened attentively, engaging in dialogue at the end of each participation. All communication was conducted in Spanish. The contributions were audio-recorded and then transcribed and translated from Spanish to English.

To analyze the experiences in the testimonios, I crafted a table similar to Wible's (2020) user empathy maps. This table, which I call testimonio map, traced the individual and collective *pain points*, or specific problems that users experience (Stanford d.school, 2020). As

shown in projects by the Stanford d.school, UX designers map user pain points to identify the specific issues of a user's experience, create empathy among participants and researcher(s), and generate possible solutions that can improve the user's experience. Testimonio mapping, however, goes beyond individual experiences as it also traces collective pain points. Additionally, because testimonios in this study also narrated approaches that participants have taken to overcome their pain points, the testimonio maps in this study also traced these approaches as civic engagement activities, mapping also the outcomes resulting from these civic engagements. In addition to pinpointing whether a participant self-identified as Indigenous, the maps also traced the place of origin, the field, and the languages that participants speak to situate each unique context.

Testimonio maps were divided into three rows that directly stem from the arc of testimonios. In the first row, individual and collective pain points were identified on the left. Direct quotes were used to identify the pain points, from where thematic issues were extracted and then placed on the right side of the first row. The civic engagements in which the participants take part based on what they quoted during their testimonios were mapped in the second row, from where thematic strategies to counteract pain points were extracted and coded as ideas "tested." The last row was used to identify the outcomes of their civic engagements on the left and the implications of these outcomes on the right (Figure 1).

After completing all individual testimonio maps in a word processing software, as the example in Figure 2 shows, themes of the main elements in the map were extracted and written in sticky notes. This sticky note strategy was used to identify and synthesize thematic categories. Although this approach may seem simplistic, it is a process that allows designers to center their attention on the process of the possibilities rather than on the outcome (Wible, 2020). Writing on sticky notes the individual themes gathered from the pain points allowed me to easily move the information to organize it according to themes. Lastly, the sticky notes were organized by collective themes and placed in a *collective testimonio map* poster that gathered all thematic pain points, civic engagement activities, and implications of such engagements. Whereas the sticky note strategy was not done in collaboration with the participants because of lack of time, this strategy can and often is done in a collaborating environment. Lastly, the information was coded without the help of digital software, but research software can be very helpful in identifying thematic categories in testimonios.

Name:	Indigenous Translator/Interpreter:
Place of Origin:	Languages:
Field:	
Pain Points:	Issues Identified:
Civic Engagement:	Ideas Tested:
Outcomes:	Implications:

Figure 1. Testimonio map template

<table>
<tr><td>User: Carlos</td><td>Indigenous Interpreter: Yes</td></tr>
<tr><td>Place of Origin: Miahuatlán de Porfirio Díaz, Oaxaca</td><td>Languages: Zapotec of the Sierra Sur and Spanish</td></tr>
<tr><td colspan="2">Field: Legal and educational field. He is a university student and a member of the Intercultural Promoters and Interpreters program. He studies Engineering and Development in Business Innovation.</td></tr>
<tr><td>Pain Points:
Discrimination
*“Most of the town [elders], about 90%, speak an Indigenous language, Zapotec. Adults suffer discrimination when they move to the city or when they work here and there.”
*“When I was at school, I was embarrassed to speak it.”
*“I got interested because the majority of the men in my town leave for the East or West Coast of the United States.”
Lack of Awareness about Indigenous Language
*“There are many people who have encountered violence and discrimination and have been incarcerated. And these are people who cannot speak Spanish perfectly, and their situation becomes more difficult.”
Decline of Indigenous Languages
*He teaches Zapotec to the kids in his community. “These are kids who are learning Spanish and are letting go of their Indigenous language.”
*“Nowadays in my community the majority are losing [the language], more so the kids, because their parents are teaching them Spanish, because of the same reason, parents don’t want their kids to suffer embarrassments or discrimination by other kids whose first language is Spanish when they arrived at the city.”
Professionalization
*“We’re seeking training in all aspects of legal proceedings, specifically to address all the challenges that may overwhelm the interpreter.”</td><td>Issues Identified:
*Professionalization of Indigenous interpreters and translators
*Discrimination
*Lack of awareness about Indigenous language rights
*Decline of Indigenous languages use
*Marginalization of Indigenous languages</td></tr>
<tr><td>Civic Engagement:
*“One day, I met a professor who also spoke an Indigenous language, Zapotec, but a different variant. She said, “I have a friend launching a campaign, the ‘Choose Wisely’ campaign, sponsored by SEDESOH [Secretaría de Desarrollo Social y Humano] here in Oaxaca. She asked if I could help translate my language so that the campaign could be launched statewide, and people could really listen to what we are trying to communicate.”
*“Since then, I became interested in translating and in knowing my language because I was embarrassed before.”
*“When the campaign was over, I learned about the program through the Public Defender’s Office in Oaxaca. I saw the information on Facebook and said, ‘I’ll register in this program, and let’s see what happens.’ This is why I am now one of the students in the Indigenous translators' group.”
*“The Secretaría de Pueblos Indígenas y Afroamericanos launched a scholarship for young Indigenous people attending university. I also benefitted from this program. In this program, we must create a project to rescue and strengthen our Indigenous languages. My proposal consisted of visiting my community on Saturdays for at least two to three hours to teach kids who are in fifth and sixth grade […]. I talk about my Indigenous language and teach them to speak it, and to write it so that they can continue to preserve the language.”</td><td>Ideas Tested:
*Participated in government and NGOs initiatives geared toward Indigenous students
*Is part of the Intercultural Promoters project
*Participates in language revitalization projects</td></tr>
<tr><td>Outcomes:
*“Now I am proud of my Zapotec language, from the Sierra Sur of Oaxaca, of Miahuatlán de Porfirio Díaz.”
*“My experience with the Public Defender’s Office has been very interesting because there are lots of us. We initiated an enormous group, and it is nice to see that we all care about our Indigenous languages.”</td><td>Implications:
*Promoted empowerment of Indigenous language speakers
*Built community
*Helped Indigenous students fulfill an academic requirement, acquire working experience, and fulfill their social commitment to their communities</td></tr>
</table>

Figure 2. Carlos’s testimonio map

Understanding Agency Through Testimonios

Traditional UX research methods, like interviews and empathy maps, focus primarily on the user experience with a specific element (product, process, or content) in a specific setting. Testimonios, however, render information about the full user experience, tracing the collective struggle of a community and promoting user agency through the call to action embedded in this important approach. Testimonios, however, have a particular goal that does not apply to all UX projects. Although testimonios can yield quantitative data, this is not their primary aim. Testimonios, as explained throughout this study, aim at building community, or connections, among participants and researcher(s) to understand complex problems at their social and cultural roots, hence the importance of situating a personal experience within the collective cultural and social contexts of each participant. Testimonio mapping expands the traditional mapping methods because it can be used in a group setting and can trace the collective voice and the civic engagement of the participants, which empathy maps struggle to accomplish.

In larger holistic studies, testimonios work well in combination with other quantitative methods. Additionally, testimonios should be used with adult audiences with enough experience to convey a personal and collective narrative, which young adults may or may not have. This method is not a tool to use in impersonal settings (like a survey via email). Researchers must invest time to build a personal connection with individuals sharing testimonios, in person or through digital video conference applications. Most importantly, to understand the value of testimonios, researchers might have to invest time and effort to learn to shift the perspective to an Indigenous lens.

RESULTS

This study examined nine testimonios: seven from Indigenous practitioners and two from non-Indigenous academics who work with Indigenous practitioners and who bring experiences as collaborators of Indigenous language mediators in different geographical spaces. This multicultural and multilingual group had diverse characteristics (Table 1).

Table 1. Study participants
Demographics of participants (n = 9)

Baseline Characteristic	n	%
Gender		
Female	6	67
Male	2	22
Nonbinary	1	11
Indigenous background		
Indigenous individual	7	78
Non-Indigenous individual	2	22
Country		
Mexico	5	56
Peru	2	22
US	2	22
Field[a]		
Educational	4	44
Government initiatives	2	22
Legal	7	78
Medical	1	11
Language[b]		
Chinanteco de San Pedro Yolox	1	11
Dutch	1	11
English	4	44
Mixteco del Noroeste	1	11
Spanish	9	100
Tarahumara	1	11
Tzeltal de los Altos de Chiapas	1	11
Zapoteco de la Sierra Sur	1	11

[a] Some participants worked in two or more fields
[b] All participants spoke two or more languages

All combined, the participants represented eight different languages, five of which were Indigenous languages. All communication was conducted in Spanish because it was the language that all participants spoke. All participants spoke at least two different languages and several of them worked in more than one field. The participants' backgrounds were also diverse (Table 2).

Table 2. Background overview of participants

Pseudonym	Indigenous Yes/No	Place of Origin	Languages	Field(s)	Current Occupation
Rosa	Yes	Oaxaca, Mexico	Chinanteco of San Pedro Yolox and Spanish	Legal; Educational	Court interpreter; coordinator of a group of intercultural promoters and court interpreters
Carlos	Yes	Miahuatlán de Porfirio Díaz, Oaxaca, Mexico	Zapoteco de la Sierra Sur and Spanish	Legal	College student; intercultural promoter and court interpreter
Alejandro	Yes	Santa María Yucuhiti, Tlaxiaco, Oaxaca, Mexico	Mixteco del Noroeste and Spanish	Legal	Court interpreter; coordinator of court interpreters and translators
Magdalena	No	Lima, Peru	Spanish and English	Educational; Legal; Government Initiatives	Social anthropologist; human rights educator; leader of an international law organization
Antonia	Yes	Chihuahua, Mexico	Tarahumara and Spanish	Legal	Interpreter for the Chihuahua State Congress; coordinator of court interpreters
Claudia	Yes	Mexico City (originally from Chiapas, Mexico)	Tzeltal de los Altos de Chiapas and Spanish	Legal	Court interpreter; coordinator of court interpreters
Lourdes	No	Lima, Peru	Spanish, English, and Dutch	Educational; Government Initiatives	Professor of Translation, Interpreting, and Intercultural Studies; International consultant
Julia	Yes	California, US	Spanish and English	Legal; Medical	Language access and human rights advocate for an Indigenous nonprofit
Valeria	Yes	California, US (originally from Michoacán, Mexico)	Spanish and English	Educational	Community organizer for an Indigenous nonprofit working with Indigenous immigrants

Testimonio mapping indicated the pain points with which Indigenous interpreters and translators grapple from both an individual perspective and a collective lens. Synthesizing the thematic issues uncovered through testimonios exposed a series of palpable issues that Indigenous professionals face in the field of interpreting and translation, such as loose professionalization systems and low and irregular wages (Figure 3). This section shows that these palpable issues sprout from more systemic problems, such as inconsistent local government policies, discrimination, and lack of awareness about Indigenous matters.

Testimonio mapping also revealed the important civic engagement activities in which participants take part to counteract the issues in their profession, as Figure 4 shows. Of the nine participants, six revealed that they take part in programs that mentor Indigenous interpreters and translators, preparing them not only with linguistic and technical strategies but also with information about how to navigate Western public systems to help their own communities; three participants engage in Indigenous rights activism through local and international initiatives; three participants take part in Indigenous language revitalization projects; and one participant is involved in intercultural translation projects that bridge collaborations between universities, government institutions, and Indigenous communities.

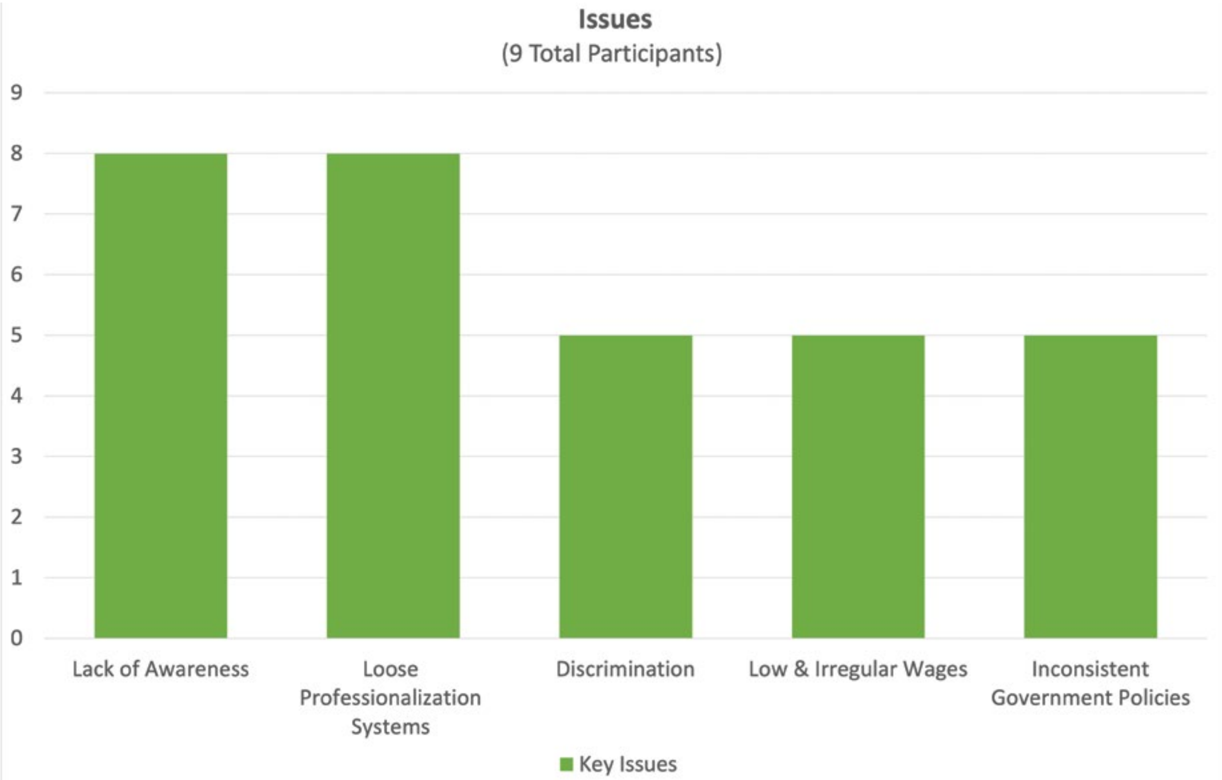


Figure 3. Issues identified by the participants

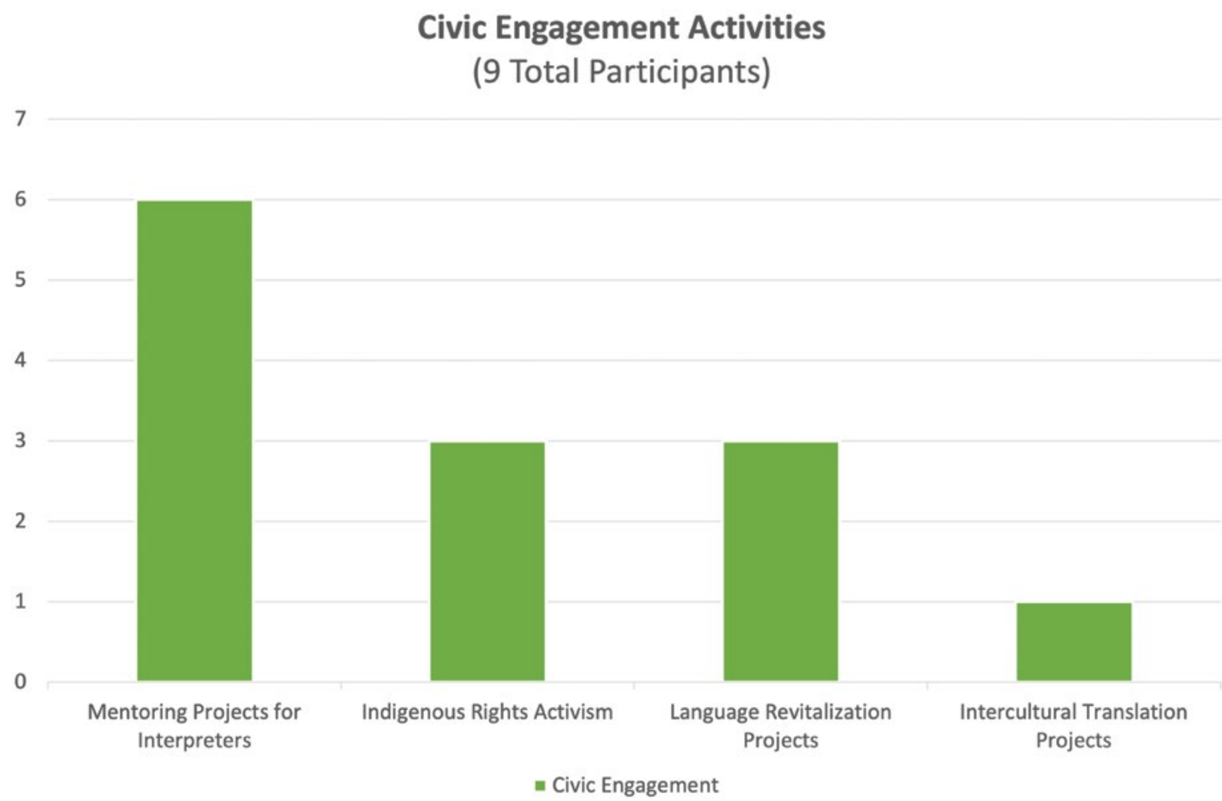


Figure 4. Civic engagement activities of the participants

The research identified five pain points: lack of awareness, loose professionalization systems, discrimination, low and irregular wages, and inconsistent local government policies.

Pain Point One: Lack of Awareness

Lack of awareness about Indigenous matters is an issue that eight of nine participants indicated, pointing out that misconceptions about Indigenous matters and Indigenous linguistic rights among public officials and public workers cause many serious problems for Indigenous people.

Magdalena, a social anthropologist from Peru and human rights educator who works with Indigenous communities on topics related to globalization, gender, Indigenous rights, and intercultural communication, explained how working with Indigenous translators helped her institution recognize the need for creating alliances between academia and Indigenous communities to help and learn from one another. She discussed how most universities in Peru do not offer a formal translation and interpretation degree in Indigenous languages and how this became a problem when she got involved in a project where the government of Peru worked with the Department of Translation and Interpreting Studies at the Universidad de Ciencias Aplicadas de Perú to translate birth, death, and marriage certificates from Spanish to the Achuar Indigenous language. In her testimonio, Magdalena explained that the Amazonian town of Achuar del Pastaza asked the government to provide them with bilingual "vital event" documents, such as birth, death, and marriage certificates so that Achuar individuals could understand them:

> These certificates are made by the Registro Nacional de Identificación y Estado Civil [RENIEC], which is the institution in charge of giving your DNI [Documentación Nacional de Identidad (National ID)]. If someone dies, they give a certificate, and also when someone is born so that these individuals can acquire a DNI.

However, as Magdalena commented, her institution could not find Achuar translators, so they ended up teaching Achuar-Spanish bilingual teachers to use technical translation strategies and software to work on the documents. Even though this project was a great example of intercultural and interinstitutional work, Magdalena questioned why the government took over 500 years to translate certificates that validate the identity of a human being into the language of the person who holds it and why most higher education institutions are not including Indigenous languages in their academic offer.

Claudia pointed out that the issues affecting Indigenous people sometimes are more accentuated within Indigenous migrant communities. Claudia belongs to a Tzeltal community from Chiapas but has lived in Mexico City for over 20 years. She explained that as an Indigenous migrant, she sees the indifference of the local government toward her Tzeltal migrant community in the city. During her testimonio, she explained how other migrant Indigenous communities in Mexico City face the same issues and informed us that after the Triqui community challenged the indifference of the local government toward their problems, violence and discrimination, the local government began paying more attention to other Indigenous migrant communities in the city:

> There is a constant struggle, but since the Triqui Indigenous movement in Mexico City, public policies in Mexico City have paid more attention to the Indigenous migrant population [. . .] because when there are Indigenous migrants, the local government washes its hands because they think that's not their problem.

Like Claudia, Valeria has also seen indifference toward Indigenous migrant communities in the US. Valeria is originally from the Mexican state of Michoacán but works as a community organizer for an Indigenous nonprofit in California. She helps Indigenous immigrants from Mexico and Central America to communicate better with their children's school districts through Indigenous interpreters. Valeria explained that sometimes Indigenous migrant communities can be invisible to the public systems; therefore, she advocates for Indigenous language rights in the school districts in the community where she lives: "The most important thing for us, for the interpreter, for the district liaison, and for me, is to ensure that Indigenous immigrants are heard in the school districts."

Alejandro was another participant who discussed the lack of awareness as a major pain point. He works as a court interpreter and coordinator of interpreters and translators at a nonprofit organization in Oaxaca,

Mexico. Alejandro explained that although several national and international laws protect Indigenous language rights, in practice, many Indigenous people do not know them, and local governments do not always respect these laws.

Pain Point Two: Loose Professionalization Systems

Participants indicated that loose professionalization systems that do not address the needs of Indigenous interpreters and translators is also one of the most prevalent issues in their field. Of the nine participants, eight mentioned this pain point as a top priority. Participants identified a series of professionalization-related issues specific to their work fields. Julia, a language-access and human-rights advocate working for an Indigenous nonprofit in California, explained that "[i]n the US, there's no certification for Indigenous languages of Mexico. There are legal and healthcare field certifications at the national level, but for other languages." U.S. courts, she explicated, have three interpreter certification categories with different pay scales. The top *certified* interpreter program is only available for Spanish, Navajo, and Haitian Creole. Individuals at the top level must pass a written and oral exam given by the U.S. Courts Administrative Office that shows expertise in English and one of these three languages. The middle *professional qualified* interpreter program applies to all other language interpreters only if they meet a strict criterion that includes passing a U.S. Department of State exam or a UN exam in English and the target language. The low *language skilled/ad hoc* interpreter program requires individuals to demonstrate their language ability at court proceedings to and from English and the target language (detailed information about the court certification programs can be found at https://www.uscourts.gov/services-forms/federal-court-interpreters/interpreter-categories).

Therefore, as Julia indicated, to work and to be remunerated as a top-tier certified interpreter of Indigenous languages in U.S. courts, individuals must have at least a high school diploma and demonstrate mastery in at least three languages (Spanish, English, and their Indigenous language), which are not always realistic requirements considering the background of these professionals. Julia explained that she works with Indigenous immigrants to find resources to help them navigate certification requirements in both the medical and the legal field through coalitions with Mexican organizations.

Alejandro indicated that Mexico has systems to certify Indigenous interpreters and translators similar to the ones in the US (by educational levels); however, two government organizations that are clearly under-resourced handle these certifications. Underfunding triggers other issues like lack of professional follow-up. As Alejandro pointed out, "who wouldn't want a certification? But not if they leave [interpreters] alone in the journey without continued training and evaluation."

As an experienced court interpreter, Alejandro also explained that because Indigenous interpreting events often take place under stressful circumstances, Indigenous language speakers are often inclined to *desahogarse* (to release distressful emotional sentiments; similar to venting) with the Indigenous interpreter; however, Western interpretation protocols prohibit interpreters from engaging in any form of personal communication with anyone for whom they interpret. Alejandro expressed that he wishes protocols would allow Indigenous interpreters to interact with Indigenous individuals before the formal interpretation begins to better understand the situation's context and better manage the *desahogo* because it inevitably happens during an interpretation process. He also said that interpreting courses do not teach them how to handle these stressful situations.

In the case of interpreting services in medical facilities, Julia explained that there is a robust system of healthcare interpreters in the US. Still, interpreters of Indigenous languages working in this industry must demonstrate proficiency in their Indigenous language and both English and Spanish, like in the legal field. Alejandro and Magdalena explained that although there are certification systems for Indigenous interpreters who work in the medical field in Mexico and Peru—the same as court interpreters, it is not common for healthcare providers to hire the professional services of Indigenous interpreters in these countries. In the medical field, Indigenous interpretations occur, but at an informal, mostly unpaid, level.

Like medical interpreters, professional interpreters in the educational field are not common in Latin American countries like Peru and Mexico. In the educational field, as Alejandro and Magdalena explained, bilingual teachers or children often provide the interpretation services needed, causing another

complex ethical layer about the role of children as language brokers. In schools in the US, bilingual educators typically interpret commonly used languages, like Spanish. However, because educators of Indigenous languages of Latin America are not common in schools, as Valeria explained, districts have come to rely on nonprofit organizations working with Indigenous migrant communities to find and mentor Indigenous interpreters. "Because I have to work with communities that are neither fluent in English nor Spanish, I have to recruit any interpreter available, whether they are accredited or certified, or have experience or not," Valeria pointed out when discussing her role as a mentor of interpreters at a nonprofit organization in California.

Pain Point Three: Discrimination

Of the nine participants, five pointed out that discrimination has caused the marginalization and decline of Indigenous languages, arguing that discrimination is a palpable issue among Indigenous translators and interpreters.

Carlos, an engineering student who also works as a court interpreter and intercultural promoter, explained that racism has produced an intergenerational issue between the older generations who only speak an Indigenous language and the younger generations who only speak Spanish. He shared that in his community, "most of the town [elders], about 90%, speak an Indigenous language, Zapoteco. Adults suffer discrimination when they move to the city or work here and there." Because of discrimination, Carlos tried not to speak his Zapoteco language at first: "When I was at school, I was embarrassed to speak it." Carlos added:

> Nowadays in [his] community, the majority are losing [the Zapoteco language], more so the kids, because their parents are teaching them Spanish, because of the same reason, parents don't want their kids to suffer embarrassments or discrimination by other kids whose first language is Spanish when they arrived at the city.

As an interpreter, Carlos helps incarcerated Indigenous people navigate the legal system, and as an intercultural promoter, he teaches Zapoteco to the children in his community. He explained: "These are kids who are learning Spanish and are letting go of their Indigenous language." He became an advocate "because the majority of the men in [his] town leave to the East or West Coast of the US." Carlos helps his community and his culture through language.

Sadly, discrimination against Indigenous people is not a new problem. It has existed for a long time outside and inside Indigenous communities. Antonia, a Tarahumara court interpreter and the coordinator of a nonprofit organization that aims at training Tarahumara court interpreters, pointed out that discrimination is also deeply rooted in their Indigenous communities: "We have heard about human rights and about discrimination for a long time, and we are still talking about the same issues with no solutions. Sometimes there's even discrimination among ourselves. What should we expect from those we aren't of our race?" Although there have been efforts to combat this issue, discrimination continues to be one of the most critical problems affecting Indigenous people and thus Indigenous interpreters and translators.

Pain Point Four: Low and Irregular Wages

Low and irregular wages in the profession was another pain point that five of the nine participants identified. As Lourdes pointed out, this is a more pressing issue in Latin American countries like Mexico and Peru. Lourdes is a Professor of Translation, Interpreting, and Intercultural Studies and Indigenous rights advocate who often works as an international consultant in matters related to Indigenous rights. She explained that although Lima, the capital of Peru, is the home of some Indigenous communities, most Indigenous court interpreters live in rural communities far away from the capital and, therefore, interpreters have to commute to Lima for court hearings. Still, the Peruvian courts do not have a set budget for travel expenses and may or may not allocate funding for it:

> [W]hat happens if the interpreter comes from a Peruvian Amazonian Achuar community and has to take first a boat of various hours of river journey to later arrive in Lima, and then take a plane [to the final destination]? Who pays for the travel expenses? Who pays for the transportation? The reimbursement isn't clear. A plane ticket costs $150 US[D] minimum.

Although the courts in the US are financially equipped with standardized rates that remunerate the work of interpreters, the educational field in the US is not yet

prepared to handle the influx of Indigenous immigrant children from Latin America. Some school districts in places where Indigenous migrant communities concentrate, like California, are increasingly trying to accommodate the needs of Indigenous families by funding in-house Indigenous interpreters. As Valeria pointed out, interpreters of Indigenous languages are not readily available because districts, like courts and medical facilities, also require interpreters and translators to have fluency in English and a high school diploma. Therefore, Valeria explained, organizations that work with Indigenous migrant communities, and sometimes the same districts, embark on a long process of finding people within an Indigenous community who can informally help as an interpreter and later be formally prepared.

Pain Point Five: Inconsistent Local Government Policies

Constant changes in local governments affect the work of Indigenous interpreters and translators both as practitioners and as advocates, as five of the nine participants pointed out. In Mexico, for instance, state governments change every six years, and each government brings a new cabinet and new policies. As a result, initiatives by one government are not always carried out by another, as Alejandro explained. He praised the Defender's Office in Oaxaca for actively hiring more Indigenous defenders, but he worried that other incoming governments might not sustain this enthusiasm toward addressing Indigenous matters. "It is important what the Defender's Office is doing" because "not all incoming governments have that perspective, and sometimes they abandon Indigenous topics," Alejandro commented.

Even when laws remain unchanged, power shifts affect Indigenous interpreters and translators. "Sometimes this happens because they are temporary governments. Those who come in new arrive without knowing how to continue the work or the commitment that others made," Antonia explained.

As the pain points show, each participant's individual experience is inherently linked to the collective experience of their community, and the pain points are intrinsically linked to their contexts as Indigenous individuals, hence the importance of using the Indigenous method of testimonio in this study.

In the following section, I discuss important findings that surfaced through the testimonios of the participants.

DISCUSSION

In general, all Indigenous language mediators self-identify as Indigenous individuals because—unlike in the case of European language mediation, where non-Europeans often choose to learn a European language to become a language mediator—non-Indigenous people do not often choose to learn an Indigenous language to become a language mediator in such language. Most people who speak an Indigenous language learn it as part of an Indigenous community.

Testimonio mapping reveals important findings that can help improve the experiences of Indigenous language mediators, both as technical communicators and as users. A testimonio is an Indigenous method that requires analysis through a non-Western lens (Medina, 2018; Menchú, 1984; Smith, 2012). Although the sample size in this study is small (as testimonio methodologies often are), from an Indigenous lens, the results are as valid as a larger sample size because the collective voices interpolate each individual experience. From an Indigenous lens, each voice represents the collective experience of the Indigenous interpreters and translators in their communities. Though each experience presents unique differences, general (collective) similarities are also represented in the pain points, which validates the data's generalizations. Namely, all participants expressed that Indigenous interpreters and translators—themselves and/or a group in their community—experience issues caused by a lack of awareness of Indigenous matters, loose professionalization systems, discrimination, low and irregular wages, and/or inconsistent local government policies. Additionally, for Indigenous individuals, speaking with a collective voice is not the same as speaking on behalf of a group. Each participant in this study, whether Indigenous or not, was speaking with the collective voice of a group because each belongs to and/or works with Indigenous communities.

Furthermore, whereas some Indigenous professionals work with *written* interpretations, as Magdalena exemplified, most work as *oral* interpreters because Indigenous languages are primarily oral languages. Digital technologies, however, are increasingly aiding

Indigenous language mediators in engaging with written translation (Gonzales et al., 2022). As the results show, the context of the individuals' community dictates the field in which they work. Most professionals work in the legal field because there is more need here, and their profession in this field is more regulated and remunerated. Like in the case of any other profession, wages in the interpretation and translation profession vary country by country. In places like Mexico and Peru, for example, where there is less funding and less accountability in following regulations about providing interpreting services for Indigenous users, interpreters are not often remunerated in the health and educational fields. Although there are more regulations and funding for language mediation in the health and educational fields in the US, Indigenous professionals do not often fit the requirements. Government initiatives are also regulated and remunerated, but fewer opportunities exist in this field.

Indigenous interpreters often work in various countries, and each country has different certification standards with complex requirements. Participants emphasized the importance of having consistent, measurable skills in the profession to impact the quality of the services provided and the status of the profession. Even within the complexities of working in a multidisciplinary, multilingual, multicultural, and multinational field by nature, Indigenous interpreters and translators argued that better standardizing systems to address their specific needs should exist across countries and professional fields. For example, U.S. courts do not have a top-tier certification for interpreters of Indigenous languages from Latin America, albeit the increasing numbers of Indigenous immigrants from Mexico and Central America who come across immigration courts.

Most participants agreed that lack of awareness about Indigenous matters causes many of the issues here addressed. Not understanding the lens of Indigenous language speakers and thus Indigenous interpreters can, and often does, provoke serious discrimination issues. For instance, not understanding *desahogo* and *dialogue* as Indigenous praxes causes unnecessary stress on both the Indigenous interpreter and the Indigenous individual for whom they provide the service.

As Alejandro explained, courts, especially U.S. courts, do not allow interpreters to have any communication with the Indigenous speaker outside the interpreting event. From the lens of Western courts, interpreters who engage in "side conversations" with Indigenous defendants during court hearings, even though these conversations are moments of *desahogo*, appear biased and thus unethical (Rivera, 2022). Chastising moments of *desahogo* during court hearings only provokes more stress on both the interpreter and the Indigenous defendant, as Claudia and Alejandro explained. Allowing a *desahogo* briefing before an interpreting event helps release some of the emotional burdens up front and gives the interpreter the context needed to perform a better interpretation, in the same way that non-Indigenous technical communicators need to know the exigence, context, audience, and purpose of a project before working on technical translations.

In the context of testimonio sharing during this study, the interactions during the roundtable produced a collective *metatestimonio* where the group built from one conversation after another until reaching a point of a collective *desahogo* that yielded the conscious feeling of "enough is enough" of the group. The cathartic moment of the metatestimonio of this group occurred right after most participants had shared their testimonios. At that point, Claudia expressed her discontent with the systems and proposed to act upon the written laws that have been created to protect Indigenous linguistic rights:

> I believe that we, as actors, must demand more from wherever we are, in Chihuahua or Oaxaca. It is by acting, in any way, and by demanding what has already been written that we'll get results [. . .]. Let's begin by asking for a dignified wage [. . .] There's the General Law of Linguistic Rights, why not use it to demand a budget for the payment of Indigenous interpreters and translators? I believe that we must continue to fight from our own trenches to implement and fulfill what has already been written.

Another issue related to a lack of awareness that the Indigenous practitioners brought up is how Spanish or English terms do not often have Indigenous equivalents that can be interpreted with one word or even one phrase. Many times, Indigenous interpreters draw on the Indigenous practice of *dialogue* to explain highly technical concepts, like "summary proceedings" or "affidavit of support" or "medical anesthesia," as

Lourdes pointed out. Then again, when interpreters engage in *dialogue*, as Alejandro explained, public officials often question the excessive amount of conversation in an interpretation that should have the same length as what was originally said to look objective through a Western lens.

Testimonio mapping also reveals important patterns about the civic engagement with which the participants engaged. Each participant engaged in activities that reflected their context. For example, younger professionals engaged in language revitalization projects that capitalize on new technologies, like creating videos to help Indigenous children become more fluent in their mother language. Conversely, seasoned professionals with more years of experience engaged in projects aimed at mentoring Indigenous interpreters and translators. Professionals with more access to resources (and to the English language as a resource), like academics and individuals working for nonprofits in the US, engaged in Indigenous rights activism. The one participant who engaged in written translation projects also came from an academic background.

As this study shows, the work of Indigenous interpreters and translators goes beyond language brokerage. Identifying the civic engagements of the participants helped increase their agency as Indigenous individuals navigating Western systems. The civic engagement activities identified also demonstrate that Indigenous professionals see their linguistic work as a service to their communities, understanding their profession as an act of activism. All in all, this study shows that Indigenous technical communicators are foremost community advocates with agency.

IMPLICATIONS FOR PRACTITIONERS

Utilizing circumscribed UX methods that include concepts foreign to the contexts of underrepresented communities may hinder the communication during a research project and the trust between the participants and the researcher(s). Therefore, testimonios can be a valuable tool to design UX projects with Indigenous individuals and other underrepresented groups who express their needs as collective needs. Testimonios intrinsically examine a user's experience in the social and cultural context of a group while revealing the user's civic engagement and call to action through a narrative, increasing user agency and supporting user advocacy. This method works well with superdiversified groups with different perspectives as it helps practitioners understand important cultural differences when grounding research on cultural contexts. When conducting research with Indigenous groups, specifically, researchers must consider the community-oriented roles of Indigenous individuals. Each participant's personal and collective narratives and the dialogue embedded in these narratives allow participants to reflect on issues at a deeper level, engaging with their unique differences while revealing general similarities.

To work with testimonios as a methodology, however, practitioners must invest time to build a relationship with the participants. It is not a methodology that can be done through impersonal modes (like email). Researchers must work with participants in person or through a digital video conferencing tool that allows participants to interact with researchers and with one another. Most importantly, practitioners must understand this methodology from an Indigenous lens (Medina, 2018; Menchú, 1984; Smith, 2012), especially when working with the unique elements of *desahogo* and dialogue. From a Western lens, a narrative from a collective voice might seem out of place; a dialogical approach to research where researchers get involved in the conversations might seem biased; and an oral cathartic release of emotion in highly technical environments often seems unprofessional. From an Indigenous lens, however, the collective voice of a narrative points out the social and cultural roots and effects of complex issues; a dialogical approach engages participants in a deep reflection and helps negotiate meaning in oral interactions, balancing the relationships of power in research; and an emotional *desahogo* leads participants to a call to action that empowers users during a research project.

In short, with the help of the multidimensional nature of testimonios, UX researchers can create better research experiences for Indigenous individuals and individuals who are part of other underrepresented groups. Testimonios can help localize, or adapt to a specific context, the design of content, products, and processes in a way that better aligns with the different contexts and experiences of Indigenous groups and other diverse groups. The testimonio approach in this study proves to be ideal for working with Indigenous

individuals in a multicultural setting, ultimately revealing that Indigenous interpreters and translators, as technical communicators, are foremost community activists with agency.

ABOUT THE AUTHOR

Dr. Nora K. Rivera is an assistant professor at Chapman University, where she teaches rhetoric, composition, and technical communication courses. Her dissertation, *The Rhetorical Mediator: Understanding Agency in Indigenous Translation and Interpretation through Indigenous Approaches to UX*, received the 2022 Outstanding Dissertation Award by the American Association of Hispanics in Higher Education (AAHHE), the 2022 Honorable Mention Award by the Latin American Studies Association (LASA), and the Graduate School Outstanding Dissertation Award by the College of Liberal Arts at UT El Paso, her PhD-granting institution. Rivera's research centers on Latinx and Indigenous rhetorics and their intersections with technical and professional communication. Her multidisciplinary work has been published in *College Composition and Communication*, the *Chicana/Latina Studies Journal of Mujeres Activas en Letras y Cambio* (MALCS), *Programmatic Perspectives*, the *Journal of Teaching Writing*, and *intermezzo*. Her forthcoming monograph, *The Rhetorical Mediator*, will be published by the Utah State University Press. Dr. Rivera can be reached at nrivera@chapman.edu.

REFERENCES

Alonso, I., & Payás, G. (2008). Sobre alfaqueques y nahuatlalos: Nuevas aportaciones a la historia de la interpretación. [On alfaqueques and nahuatlatos: New contributions to the history of interpretation]. In C. Valero-Garcés, C. Pena & R. Gutiérrez (Eds.), *Investigación y práctica en traducción e interpretación en los servicios públicos: Desafíos y alianzas* [*Research and practice in translation and interpretation in public services: Challenges and alliances*] (pp. 38–51). Universidad de Alcalá.

Benmayor, R. (2012). Digital testimonio as a signature pedagogy for Latin@ studies. *Equity & Excellence in Education*, *45*(3), 507–524. https://doi.org/10.1080/10665684.2012.698180

Campbell, L., & Mithun, M. (1998). Native American languages. *Microsoft Encarta Encyclopedia*. Microsoft.

Cardinal, A. (2022). Superdiversity: An audience analysis praxis for enacting social justice in technical communication. *Technical Communication Quarterly*. https://doi.org/10.1080/10572252.2022.2056637

Delgado, D., Burciaga, R., & Flores J. (2012). Chicana/Latina testimonios: Mapping the methodological, pedagogical, and political. *Equity & Excellence in Education*, *45*(3), 363–372. https://doi.org/10.1080/10665684.2012.698149

Gonzales, L., Leon, K., & Shivers-McNair, A. (2020). Testimonios from faculty developing technical & professional writing programs at Hispanic-serving institutions. *Programmatic Perspectives, 11*(2), 67–93.

Gonzales, L., Lewy, R., Hernández Cuevas, E., & González Ajiataz, V. L. (2022). (Re)designing technical documentation about COVID-19 with and for Indigenous communities in Gainesville, Florida, Oaxaca de Juárez, Mexico, and Quetzaltenango, Guatemala. *IEEE Transactions on Professional Communication, 65*(1), 34–49. https://doi.org/10.1109/TPC.2022.3140568

INALI. (2008). *Catálogo de las Lenguas Indígenas Nacionales.* [*Catalogue of National Indigenous Languages.*] Diario Oficial de la Federación.

Kovach, M. (2010). *Indigenous methodologies: Characteristics, conversations, and contexts*. University of Toronto Press.

León-Portilla, M. (1991). *Huehuehtlahtolli: Testimonios de la antigua palabra*. [*Huehuehtlahtolli: Testimonios of the ancient Word.*] Fondo de Cultura Económica.

Macri, M. J. (2005). Nahua loan words from the early classic period: Words for cacao preparation on a Río Azul ceramic vessel. *Ancient Mesoamerica*, *16*(2), 321–326. https://doi.org/10.1017/S0956536105050200

Medina, C. (2018). Digital Latin@ storytelling: Testimonio as multi-modal resistance. In C. Medina & O. Pimentel (Eds.), *Racial shorthand: Coded discrimination contested in social media*. Computers and Composition Digital Press/Utah State University Press. http://ccdigitalpress.org/book/shorthand/chapter_medina.html

Menchú, R. (1984). *I, Rigoberta Menchú: An Indian woman in Guatemala* (E. Burgos-Debray, Ed.; A. Wright, Trans.). Verso.

Mora Curriao, M. (2007). La construcción de sí mismo en testimonios de dos indígenas contemporáneos. [The construction of the self in the testimonios of two contemporary Indigenous people.] *Documentos lingüísticos y literarios*, (30). http://www.revistadll.cl/index.php/revistadll/article/view/214

Phillips, L. L, & Deleon, R. L. (2022). Living testimonios: How Latinx graduate students persist and enact social justice within higher education. *IEEE Transactions on Professional Communication, 65*(1), 197–212. https://doi.org/10.1109/TPC.2022.3140569

Quijano, A. (2000). Coloniality of power and Eurocentrism in Latin America. *International Sociology*, *15*(2), 215–232. https://doi.org/10.1177/0268580900015002005

Rivera Cusicanqui, S. (1987). El potencial epistemológico y teórico de la historia oral: de la lógica instrumental a la descolonización de la historia. [The epistemological and theoretical potential of oral history: from instrumental logic to the decolonization of history.] *Temas Sociales*, *11*, 49–64.

Rivera, N. K. (2022). Managing Indigenous language interpretation and translation services in the public sector. In A. Castellanos García, L. Gonzales, C. V. Kleinert, T. López Sarabia, E. Matías Juan, M. Morales-Good, & N.K. Rivera (Eds). *Indigenous Language Interpreters and Translators: Toward the Full Enactment of all Language Rights*. Enculturation Intermezzo. https://intermezzo.enculturation.net/16-gonzales-et-al.htm?fbclid=IwAR3-4coyNo_i1M-wP3td4vX08LSPiTmpCBrU5cUmPyp93RhwFqVyfcnW-YM

Rivera, N. K., & Gonzales, L. (2021). Community engagement in TPC programs during times of crises: Embracing Chicana and Latina feminist practices. *Programmatic Perspectives*, *12*(2), 39–65.

Smith, L. T. (2012). *Decolonizing methodologies: Research and Indigenous peoples* (2nd ed.). Zed.

Stanford University d.School. (2020). About. Retrieved September 15, 2020, from https://dschool.stanford.edu/about.

Sun, H. (2012). *Cross-cultural technology design: Crafting culture-sensitive technology for local users*. Oxford University Press.

Tuck, E., & Yang, K. W. (2018). *Toward what justice? Describing diverse dreams of justice in education*. Routledge.

UN Commission on Human Rights. (1982). *Report of the sub-commission on prevention of discrimination and protection of minorities on its 34th session: Study of the problem of discrimination against indigenous populations.* https://www.un.org/development/desa/indigenouspeoples/publications/2014/09/martinez-cobo-study/.

Vespa, J., Armstrong, D. M., & Medina, L. (2020). *Demographic turning points for the United States: Population projections for 2020 to 2060* [Report]. United States Census Bureau. https://www.census.gov/library/publications/2020/demo/p25-1144.html.

Wible, S. (2020). Using design thinking to teach creative problem solving in writing courses. *College Composition & Communication*, *71*(3), 399–425.

Gamifying Good Deeds: User Experience, Agency, and Values in Play During a Descriptathon

doi: https://doi.org/10.55177/tc124312

By Brett Oppegaard and Michael K. Rabby

ABSTRACT

Purpose: This study compares value expressions of intervention designers and participants in a hackathon-like event to research relationships between values and gamification techniques. Our research identifies and analyzes value expressions during a large-scale intervention at national parks for social inclusion of people who are blind or have low vision. Researchers and organizations can use our model to create common-ground opportunities within values-sensitive gamified designs.

Method: We collected qualitative and quantitative data via multiple methods and from different perspectives to strengthen validity and better determine what stakeholders wanted from the gamified experience. For methods—a pre-survey, a list of intervention activities, and a post-survey—we analyzed discourse and coded for values; then we compared data across sets to evaluate values and their alignment/misalignment among intervention designers and participants.

Results: Without clear and focused attention to values, designers and participants can experience underlying, unintended, and unnecessary friction.

Conclusion: Of the many ways to conceptualize and perform a socially just intervention, this research illustrates the worth of explicitly identifying values on the front end of the design intervention process and actively designing those values into the organizational aspects of the intervention. A design model like ours serves as a subtextual glue to keep people working together. The model also undergirds these complementary value systems, as they interact and combine to contribute to a cause.

KEYWORDS: Values, Gamification, Audio description, User experience, Visual impairment

Practitioner's Takeaway

- Values are invisible and often unarticulated but also powerful and ever-present. Identifying values in social-justice contexts and tailoring designs to align could lead to better organizational cultures.
- Designers must pay attention to the intervention, such as Audio Description training, but values should also be identified before, during, and after a public intervention to project, maintain, and track organizational culture, efficiency, and effectiveness and to prevent an unnecessary undercurrent of misaligned values.
- Gamification techniques can be designed to support, heighten, and even amplify values in organizational contexts, which could lead to better empirical understandings about their efficacy.

INTRODUCTION

Public places are constantly made and remade through emerging technologies. Although aspects of built public environments may unravel in that making/remaking process, widespread and diverse improvements in media accessibility illustrate how people are coming together for common causes in public and localized contexts. Improving accessibility can help us enrich the lives of people within a media ecosystem. In improving accessibility, technical communicators have important roles, alongside urban planners, architects, engineers, and others. They can contribute through interventions and research analyses to design and create more-inclusive media. In a research-and-development environment, technical communicators in design roles offer attention to shared values of diverse stakeholders in a community and can contribute to improved environments. Technical communicators, in turn, must ask how designers can account for individual values, and they also must address how to localize and integrate values fairly and inclusively across media ecosystems.

Our research team offered well-intentioned accessibility interventions in national parks for years before considering the individual values we were including—and unintentionally excluding—in our hackathon-style events, called Descriptathons. These interventions are aimed to localize media and improve public places through better Audio Description. We sought to transform visual media into audible media, primarily to benefit people who are blind or have low vision. Improving Audio Description requires an iterative and highly collaborative process: people with sight write and rewrite descriptions, people who are blind or have low vision (as ultimate consumers) listen to descriptions and provide feedback to enhance them, and researchers coordinate and assess the interplay between these stakeholders.

In a Descriptathon, our research identifies a public place that needs more accessible media, invites that public place to participate, and starts those describing efforts by remediating its printed brochure, the key orientation discourse for any public place. For example, with the Santa Monica Mountains National Recreation Area in southern California, its brochure featured a collage of activities and images around the area (Figure 1), including maps that needed describing. During the Descriptathon, the describing team's members, including staff and non-affiliated people who were blind or low vision, worked together to learn about and to apply the foundations of Audio Description to the brochure. They initially practiced fundamentals related to typical genres of visual media, including collages. They also competed in friendly contests related to those fundamentals. By the end of the three-day workshop of the intervention, they had applied these new skills to the team's brochure, including describing the collage shown in Figure 1, and they released that description to the public.

Audio Description typically is longer and more descriptive than alternative text (alt-text), which usually provides a quick description (1–2 sentences). The collage Audio Description by the Santa Monica Mountains' team was broken into 15 distinct components with a total run time of 20 minutes. (Those descriptions can be heard on the project's website, www.unidescription.org, and via the project's free mobile apps.)

Using hackathons as our inspiration and gamification techniques as our mechanics, we designed these Descriptathons as friendly competitions to motivate and engage volunteers to make more and better descriptions. When volunteers share with teammates and the larger community, quality controls emerge organically through small-group dynamics and description contests, creating accountability and light, but competitive, tension among both individuals and teams. We also pay people who are blind or have low vision to perform independent checks on the descriptions after the Descriptathon—to meet basic professional standards before being released to the public. This "friendly competition" approach works for most people.

With this study, we considered our intervention designs, focusing our attention on individual values and whether they align among intervention designers and participants. This study generated fresh and profound insights. Most of the people volunteer for workshop activities, and researchers and practitioners alike benefit when the Audio Description process is motivating, engaging, and rewarding for those involved and when it connects across common values. Descriptathon participants are busy and have options for their time; they do not want to practice writing to be better writers or only to socialize. They want to devote their time—and to communally practice writing

Audio Description—to help make more-accessible public places. As they contribute, they consider these public places as contexts, but they also maintain their individual values as subtext. Values, from this perspective, are defined as "trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or group" (Schwartz et al., 2012, p. 2). Values are organized into a coherent system by each person through social and psychological conflict or congruity between values that people experience when they make everyday decisions. Values help to explain each individual's decisions, attitudes, and behaviors. Universal values, at the top layer of importance, are grounded in the three basic needs that humans have: biological processes, social interaction, and survival. These needs are not discretely separated but part of a continuum of related motivations, which can be visualized (Schwartz et al., 2012) as concentric rings that are interrelated and reactive of other values in the system.

Scholars know little about relationships between or among values—especially localized cultural values—and gamification techniques (Usunobun et al., 2019). Many scholars hypothesize that understanding such values may help to unlock unrealized potentials in gamification techniques that relate to participant motivation and in a circular fashion may more deeply connect participants to those gamified approaches. In other words, gamification—the use of games in non-game contexts (Deterding et al., 2011)—offers a

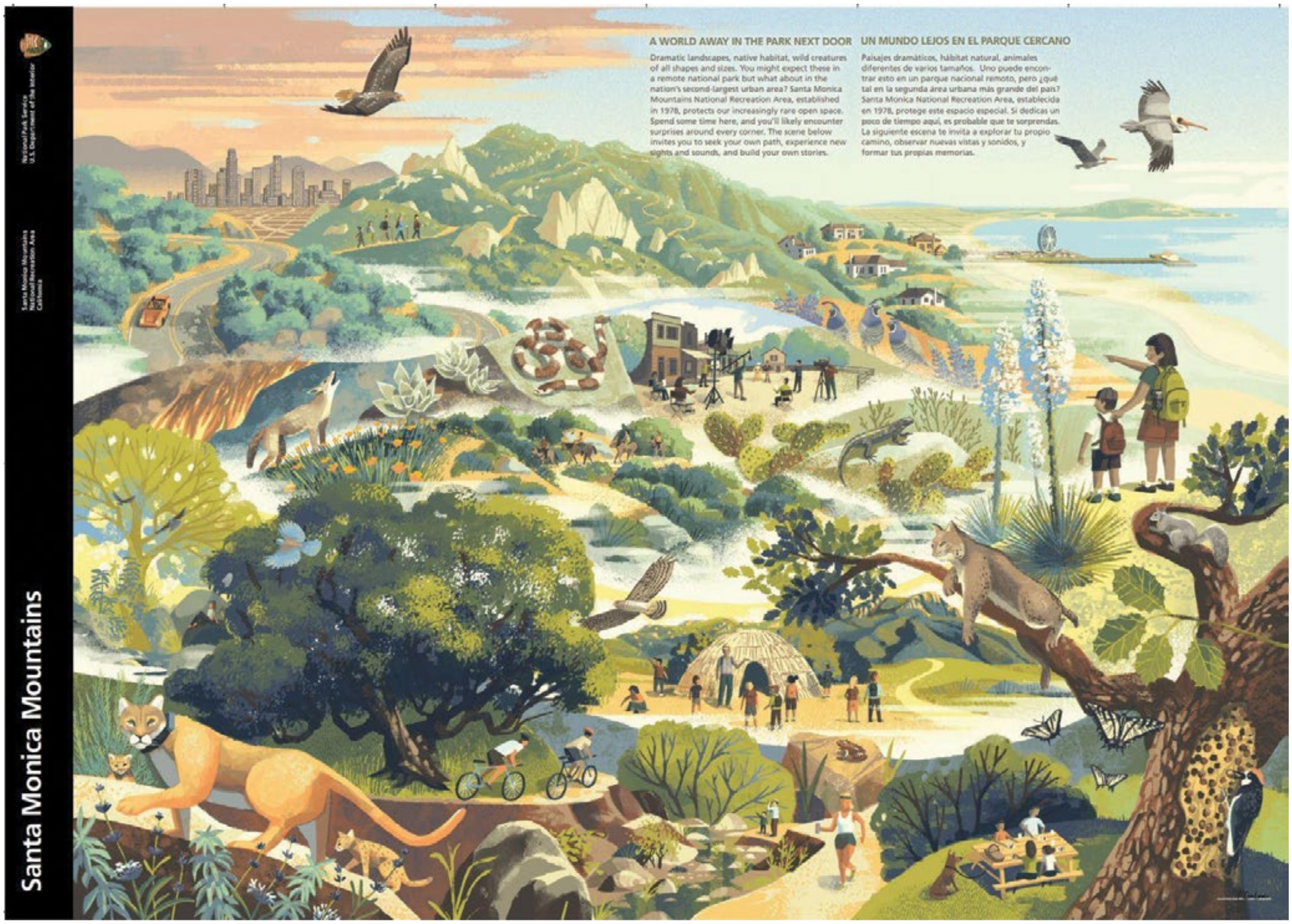


Figure 1. Complexities in collage description—brochure for the Santa Monica Mountains national recreation area in Southern California (National Park Service, n.d.)

Note. How would you describe this image to a person who is blind or who has low vision? Listen to how the Santa Monica Mountains' Descriptathon team did it via https://bit.ly/UniD_SantaMonicaMountains(Turnham, 2019).

promising solution to many social-justice dilemmas. Mounting evidence indicates the effectiveness of gamification in research improves the quality and quantity of data (e.g., Cechanowicz et al., 2013; Van Berkel et al., 2017). How individual values relate to this gamification effectiveness, though, has been an underdeveloped area of interest. Gamification studies fit well in technical communication (TC) because they involve core areas of concern, including how technical communicators manage information, develop systems, align values, create better usability and user experiences, and connect producers and consumers through interfaces. Game design also adds to TC interests with an emphasis on user testing, iterative design, and rapid prototyping (deWinter & Vie, 2016).

Instead of trying to simplify the inherent complexity of our project, we sought ideas at the core of what we were trying to accomplish. We circled back to the high-level concept of individual values. Specifically, we asked, what values do our participants who do and do not see well share—among intervention designers, user/designers, and administrators—that durably engages them in the process of making, consuming, and circulating Audio Description?

Descriptathon Origins and Evolutions

For several years, our research team has been working with the U.S. National Park Service (NPS) to study and provide audio-described formats for its print brochures, including intense periods of open-access, open-source software development. During those processes, we created the robust technical tools and gathered the associated wherewithal to produce and disseminate and simultaneously research Audio Description. We thought we had overcome the toughest part of the research problem.

When we started this project, a suitable and no-cost production system for creating those connections did not exist. In response, we turned first to such immediate concerns: How could we design an accessible and useful system for this co-creation process, which gave both describers and audience members sufficient agency to collaborate and to find that collaboration worthwhile? Each step in the process raised new questions about the fundamentals of Audio Description, including best practices, usual collaborative processes, and overall efficacy. This new area of study offers vast unrealized potential (Fryer, 2016; Matamala & Orero, 2016), and our focus on the role of individual values in this work opens a fertile path for exploring.

When we first released these audio-describing tools in beta form, we turned to the NPS to test the tools with staff members at an urban recreation area, a natural landmark, and a historical monument. After three hours of phone orientation with each person about Audio Description and these tools, we asked them to make public places more accessible. That hands-off approach did not work well (Oppegaard, 2020). As these initial collaborators experimented with the tools and asked questions about Audio Description, we began to understand and appreciate what Flanagan et al. (2008) described in a playful metaphor as juggling a big project's "balls in the air." As a remedy, we considered an organizational focus on values to reduce tangential chaos.

That "balls in the air" metaphor (Flanagan et al., 2008) outlines an array of foreboding obstacles for researchers who want to study the human and social dimensions of technology. For this technology, we needed to not only build and maintain the software but also reconcile divergent and sometimes contradicting best practices, recruit describers and audience members to create and review, disseminate final products, attract audiences, and keep them engaged, while each image provided its own challenges. For ontological, epistemological, and philosophical reasons, we created the gamified hackathon-like Descriptathon (Oppegaard, 2020).

The UniDescription Project (UniDescription, n.d.) began in fall 2014 as a grant-funded initiative, with a concrete objective of audio describing 40 U.S. NPS Unigrid brochures. We have surpassed that benchmark, including work with 150+ NPS sites plus public places including sites managed by Parks Canada, National Parks UK, and U.S. Fish & Wildlife Service. Our research team always starts our collaborations by focusing on the description of the printed and silent site-orientation brochures, like those any visitor will find in a visitor's center. These brochures contextualize their places and highlight attractions and amenities. They include images and often at least one map of extreme visual complexity (Conway et al., 2020) to orient visitors to the sites. Brochures may exist in alternative formats such as PDFs and sometimes include thinly developed alt-text, but without a screenreader-accessible format with accompanying Audio

Description, these materials generally offer limited or no access to basic information for people who cannot see them or see them well. When our research team and government liaison began transforming the UniD concept into a public intervention in the mid 2010s, we created our designs with a foundation of greater scope, including attention to legal, ethical, and moral obligations related to media accessibility. From a practical perspective, we started by building the online tools, distributing them to staff at a few park sites, and waiting for the descriptions to materialize. That top-down-design approach was efficient but generally ineffective (Oppegaard, 2020).

In spring 2017, during the NCAA March Madness basketball tournament, we were looking to liven up our media-accessibility work. Descriptathon 1 (D1 in fall 2016) consisted of traditional online training—compressed and action packed but not "fun." Inspired by the energy and enjoyment of the sports tournament, we reimagined our project as a serious game that was created to improve accessibility rather than for pure entertainment. This game, in other words, would be entertaining and engaging through its intellectualism, social-justice aim, and camaraderie while making public places more accessible. We could transform sites into teams that compete. From that context, a novel approach emerged. We remotely established teams of park staff from around the country, and we hired two consultants as representatives of our target audiences, knowing that a localized and inclusive approach would lead to better results and more directly serve the target audience.

The event generated a dramatic contrast to our initial outreach. The gamified Descriptathon, even at its rudimentary stages and with the same objectives as the original, was intriguing. It was exciting. Participants even called it "fun." We could hear energy in participants' voices, as they engaged in friendly competition. They earned acknowledgement. They described their brochures and enjoyed the process, becoming part of a bigger community with a higher purpose. After D2, we realized that we would never return to the original approach, but we knew we still needed to improve the Descriptathon idea.

We gradually made teams more diverse and inclusive, which also meant they became more complex to manage. In 2017, we welcomed members from the American Council of the Blind to participate, and we also now include members of the Blinded Veterans Association, Royal National Institute of Blind People (UK), Canadian Council of the Blind, and Helen Keller National Center for DeafBlind Youths & Adults. Teams (5–10 members each) have included hundreds of members from across the US, and we have worked internationally with public places managed by Parks Canada and National Parks U.K. What connects different people from different places with different interests and agendas and keeps them engaged in the social-justice process of making the world a more-accessible place through Audio Description? Gamification clearly plays a role. But what fundamentally keeps the players playing?

In our ongoing grounded theory (Levitt, 2021) of the Descriptathon intervention, we identified shared values as a key contributing factor. We originally did not design the Descriptathon through a values-oriented perspective, were not focused on the values present in the work, and had not adapted the intervention to better align with shared values. Bluntly, we took shared values for granted. In retrospect, we did not understand how values inherently were woven into our intervention, and we failed to understand how they were being co-created and developed or ignored by both organizers and participants or how they were supporting or opposing larger objectives of the intervention.

This study's values-focused analysis shifted our point of view. It illustrated the presence or absence of shared values and their roles in the interdisciplinary Descriptathon process. It also alerted us to opportunities for refining relationships between organizers, intervention designers, and user/designer participants. Our findings can help others, regardless of the intervention's aim, by showing how values and gamified techniques can operate in tandem and can align, propelling the work, or conflict, that causes misalignment and difficult-to-diagnose friction.

Gamification of Values

Precisely defining the terms *gamification* and *gamified techniques* goes beyond the scope of this paper. We will describe how we are using these terms but aim to direct related debates to other venues. For our purposes, a *game* is a structured activity that follows certain rules and has a beginning and an end, and the players use those rules toward a goal (Mildner & Mueller, 2016).

In that definition, no specific impetus exists to generate fun or motivate participants. Such Serious Games—as called since the 1970s (Abt, 1987; Wilkinson, 2016)—have proliferated in both consumer culture and academia and typically maintain an educational or social-justice emphasis (Breuer & Bente, 2010). A key distinction of gamification is that game-design elements are integrated into non-game contexts, which can be serious and real-world endeavors (Deterding et al., 2011). "Game elements" are not "a game" on their own but instead are parts of a game that could create fun (Mildner & Mueller, 2016). Principles include "competition" as a game element (Caillois & Barash, 1961), with game elements also including "challenge," "fellowship," "discovery," and "expression" (Hunicke et al., 2004) as well as "rules," "goals," "interactivity," "outcome and feedback," and "problem solving" (Prensky, 2007). Given this multitude of ideas and lack of consensus, we label our Descriptathon in general ways, as a partially developed Serious Game that includes multiple game characteristics, elements, and mechanics, including rules, a beginning and end, teams, competition, judging, points, badges, leaderboards, and clear goals.

Our larger objective goes beyond arguing for the Descriptathon's gameful nature. Instead, our interest lies in how its gamified elements and mechanics interact with our participants' values and potentially increase motivation and engagement in ways that neither an academic focus on gamification or on values alone could accomplish. Along this line, with recent theorizing and discussion about gamification, scholars have attempted a small amount of empirical work to provide evidence of its efficacy (Seaborn & Fels, 2015). Gamification, as an approach, has shown identifiable limits in what can be expected from its use (González-González & Navarro-Adelantdao, 2021). Yet, we now think that studies that combine values with gamification concepts could lead to novel contributions to establish empirical evidence of gamification's efficacy. In these respects, our intent is to empirically examine values within a specific gamified context to motivate and engage participants.

Hackathon-like events inherently include game mechanics, such as teamwork, competition, and the timed pursuit of collective goals (Porras et al., 2018). They also provide an opportunity for people to collaborate and create new connections with benefits that extend beyond the short-term event (Briscoe & Mulligan, 2014). In a more-precise sense of the Descriptathon's design, we envision its gamification aspects along the lines of punctuated play (Foxman, 2020), in which our focus is not on game design but on the players and how they play. By connecting gamification with values and studying those overlaps, we aim to dig deeper into what makes a Descriptathon successful and discover ways to create even richer experiences, combining everyday accessibility concerns with a punctuation of "meaningful, ludic moments" (p. 55). This leads to the core of value-sensitive design (Sackey, 2020), the embrace of shared values in communal activities that minimize any participant's marginalization.

Values

Values are another complex and highly contested arena of academic discourse. Again, our intent is not to settle these debates but to transparently outline our approach. This work was inspired and informed by Agboka (2013), Flanagan et al. (2008), and Usunobun et al. (2019) and grounded by adhering to and applying the Theory of Basic Individual Values (Schwartz et al., 2012). Values are an extension of scholarly attention to culture (Schwartz et al., 2012), developed extensively in a cultural context (Schwartz, 1992, 1999; Schwartz & Bilsky, 1987), starting with 10 basic values (Schwartz, 1992). These values were tested in an international setting (Schwartz et al., 2012), and that refinement process led to an expanded list of values, what's now known as the Theory of Basic Individual Values, which identifies common values defined by motivational goals. The theory includes 19 values, which we tested in our analysis of values present or absent in our latest Descriptathon intervention. These values include Universalism-concern, which is defined as a commitment to equality, justice, and protection for all people. Before starting our analysis, we correctly speculated that Univeralism-concern would be present in the expressions of values we had collected, but we also discovered other values in play that were not as predictable.

In our analysis of the discourse of Descriptathon participants, we found that they expressed several values but did not express others, which led us to concentrate on values that participants expressed. This study also shows ways in which values are active and important

in design decisions, including in gamified contexts, whether those are articulated or instead circulating in the subtext.

To distinguish values from other factors in our work, including the gamified techniques, we pursued the following research questions in a post-mortem analysis of D8:

RQ1: What values underlie the reasons volunteers participate in this project?

RQ2: What values underlie the reward system in this public intervention?

RQ3: How do the values expressed by participants and values expressed by intervention designers differ? How can these potential differences be addressed and realigned to create common ground?

This manuscript outlines the methods we used for the analysis, as well as our results and interpretations.

METHOD

We analyzed three data sets for the presence of value statements:

1. A pre-Descriptathon survey, which asked about motivations for participation
2. A during-Descriptathon list of recommended activities
3. A post-Descriptathon survey about highlights and opportunities to improve the experience.

Data-collection processes were approved by the lead author's Institutional Review Board and by the federal government's Office of Management and Budget.

For D8, 111 adults (ages 36–65 years) participated in the remote event in the US, Canada, UK, and Nigeria. Participants were organized into 16 teams, plus an 11-person administrative group, with seven administrative members also joining teams and co-creating Audio Descriptions. All identifiable data from the administrative group members were removed from our samples before analysis, to focus on participant responses without conflict of interest.

D8 started five weeks before October 26, 2021, when recommendations for prep activities were first released; recommendations included instructions to RSVP to D8 Calendar invites, an invitation to peruse our library of online resources, and a suggestion to listen to the project's mobile app. Each ensuing week, participants received activities to help them prepare for the intervention and to excite them about D8. Each day of D8, their "To-Do List" contained new activities to create a dynamic unfurling of the event, starting slowly, building into the intense competition phase, and culminating in the championship round for the vaunted trophy, a coconut playfully painted and personalized to celebrate the winners.

In terms of positionality, a constructivist and inductive approach (Levitt, 2021; Rennie, 2000) was undertaken to analyze data. The researchers kept duties separated to establish reliability in our findings. The first author on this manuscript (who is sighted) created the Descriptathon intervention idea in 2017 and has designed and managed each of its iterations. He collected the data in D8 and handed raw data to a two-person team who independently analyzed it. The second author, also sighted, and the lead coder has not participated in any Descriptathon and joined this study to provide an independent analysis of the D8 data. The third member of the research team, who is blind, has participated in multiple Descriptathons, including D8; she did not have a role in its design and organization or in the creation of the codebook but served as a paid research assistant. Her role involved independently coding data, based on the provided codebook, and working with the second author to attain reliability in that analysis process. The administrative team also included representatives from various disciplines including education, history, and public lands management.

We created the gamified reward system for this intervention, providing each participant a personalized, dynamic, and online to-do list. As a part of the list, each activity in the intervention was given point values (established by the organizers), and participants accumulated a score for individual efforts as well as team points, earned through collective activity (e.g., submitting a single description crafted in a collaborative session). The D8 website included a leaderboard for individuals and teams, with the top 20 names and points shown (to reward top contributors yet without showing and potentially embarrassing people who were contributing less). All participants knew individual scores by score inclusion on individualized event home pages, which only they could access. All team scores were posted on a separate leaderboard, allowing groups to compare their collective efforts. At the core of these scoring systems was the activity list, where participants

were potentially mobilized and motivated by point values.

We collected data from registration of the event until the completed brochure description was shared with public audiences. As a part of data collection, we asked people why they wanted to participate in D8. Of the eligible participants, 80 wrote separate comments with reasons for participation. Using Schwartz et al.'s (2012) values and Krippendorff's (2019) protocols, we examined the underlying values in the responses. Many of these values, such as those close to security and power, did not have relevance here and were removed. After reducing values to 10, through an initial single-coder review of data, we added a second coder to establish reliability of the codebook with its value codes.

After further reviewing and discussing how values emerged in the participants' responses, we reduced the list to seven values present in most comments. Once the dataset was coded, two uncoded statements remained. After discussing amongst coders, we added an eighth value (Self Direction-action) back into the codes and applied to those two statements (later, we added a ninth value identified and discussed further, in during-Descriptathon list of recommended activities). The coders agreed that the responses could have more than one value. For example, "This event seemed like a fun opportunity to improve my communication skill and more importantly to level up our whole organisation's output with regard to those needing text descriptions to access information" demonstrates two values: Self Direction-thought (the chance to improve oneself and one's skills) and Universalism-concern (the chance to help others). For the first round of content analysis, to test reliability, both coders independently labeled 20 statements, using Schwartz et al.'s (2012) values in a closed analysis, allowing double and triple coding. That exercise resulted in 26 value codes being applied, meaning multiple statements had more than one code but each statement had at least one code. Intercoder reliabilities were sufficiently strong, as indexed by Cohen's kappa (κ = .71); the percentage of agreement between the two independent coders was 76.9%. The remaining statements were then analyzed by the second coder, with the instructions to leave any statements uncoded if one of the seven pared-down list of values did not apply.

FINDINGS

The values that emerged from analysis and their definitions are listed in Table 1.

Table 1. Values and their definitions (Schwartz et al., 2012)

Value	Definition
Achievement	Success according to social standards; winning something; they motivate people to compete and seek admiration for their success; an action gets done just for the sake of the action
Benevolence-caring	Devotion to the welfare of ingroup members; related specifically to relationships; helping others; responsive to the needs of friends
Conformity-rules	Compliance with rules, laws, and formal obligations (legal; obeying rules); it's our mission, obligation
Hedonism	Pleasure and sensuous gratification (not for competition); fun; enjoyment
Self Direction-action	Freedom to determine one's own actions
Self Direction-thought	Freedom to cultivate one's own ideas and abilities; emphasis on ability to cultivate one's own ideas and abilities (skills); learning things and improving abilities; training
Stimulation	Excitement, novelty, and change; new experiences; getting to know new people
Universalism-concern	Commitment to equality, justice, and protection for all people; defense of a right; desire for people to be treated justly even if they do not know them; making things accessible to all
Universalism-tolerance	Acceptance and understanding of those who are different from oneself; taking another perspective; I want to understand the perspective of another person

Values emerged at different points in the Descriptathon process, dependent on the stakeholder's interests, revealing a complexity to the dynamic between values and gamification that deserves more attention.

Pre-Descriptathon Survey Findings

All D8 participants were asked to register at least one month before the event and to answer a variety of demographic and organizational questions, including a values-oriented question, added to our survey with the intent to illuminate the potential presence of values. We asked, "Reason(s) You Wanted to be Involved: To help us understand our Descriptathoners better, and to serve you better, could you please tell us the primary reason (or reasons) that motivated you to join this Descriptathon?"

Responses to this survey were voluntary. The response rate was about 72.0%. Of the 80 statements received in response, 61 had one value code, 16 had two value codes, and three had three value codes (102 identified value codes). Though the majority of statements contained one clearly implied value, multiple values could emerge in the data. For example, the following statement had values of both Self Direction-thought and Conformity-rules: "To better understand and practice AD, and accept the opportunity to help us audio describe our Ala Kahakai NHT brochure to help us towards 508 compliance and better serving all audiences." Another statement had three values—Self Direction-thought, Stimulation, and Hedonism:

> I love the idea of audio describing the world and the mission and purpose of the UniDescription Project. My audio description skills improved the last time I participated and it was really challenging and fun. I worked alone last time and am looking forward to collaborating with a team this year.

In the three statements that had three values, Self Direction-thought and Hedonism were always two of the values; people participated because they wanted to improve their skills and have fun, alongside a third motivating value. For example, one participant noted Self Direction-thought ("I'm also excited about learning UniDescription to improve my communication skills"), Hedonism ("It brings me joy that I could make a difference"), and Benevolence-caring ("… to support an initiative that can help disabled communities for so many for years to come").

Nearly two thirds of the values that emerged in this Pre-Descriptathon Survey data were either Universalism-concern or Self Direction-thought (see Table 2). Among the eight values that motivated people to participate in this project, these two merit more discussion.

Table 2. Values participants brought to the Descriptathon vs. values designers expressed via formal activities

Value	Reason for Participation (n = 102)	Activities With Rewards (n = 162)
Universalism-concern	40 (39.2%)	0 (0.0%)
Self Direction-thought	27 (26.4%)	33 (20.4%)
Benevolence-caring	11 (10.8%)	1 (0.6%)
Hedonism	9 (8.8%)	20 (12.3%)
Universalism-tolerance	5 (4.9%)	0 (0.0%)
Conformity-rules	4 (3.9%)	2 (1.2%)
Stimulation	4 (3.9%)	12 (7.4%)
Self Direction-action	2 (1.9%)	16 (9.9%)
Achievement	0 (0.0%	78 (48.1%)

The most frequently identified value among the D8 participants was Universalism-concern. From this perspective, people inherently deserve these inalienable rights, which differ from laws. Laws only require baseline obligations; from a broader view, public places and resources should be accessible to all people, and all people should receive equal treatment. Sometimes, this value emerged in direct statements, such as "To

provide the most accessible information for our visitors." In other cases, participants noted a duty at their workplaces to improve accessibility: "To make the newly re-done Whitman Mission NHS [National Historic Site] brochure as accessible as possible" and "To help make my park's brochure more accessible and versatile for other applications if desired."

Other responses in which this value emerged focused on accessibility as part of the participant's understanding of the world and their own personal growth. In one instance, the participant felt it important to put aside personal needs/desires/fears to improve accessibility for others: "I did not want to do this at first because writing and describing things are not easy for me. We have to go beyond our comfort zones to make a more inclusive environment for all." More often, participants noted that their experiences drove them to improve accessibility for all e.g.:

> As someone who has experienced vision loss in the past couple of years [*sic*] I'm navigating a world in new ways. Accessibility of public spaces and places of interest can be patchy at best [*sic*] and I was really keen to be a small part of improving audio description and accessibility of places which sighted people are so readily able to enjoy and "To make a difference. As I plan to study further [and] with low vision I would like more things to be accessible."

The other frequently emerging value was Self Direction-thought, a value that focuses on freedom to cultivate one's own ideas and abilities. Often, these statements referenced direct skill acquisition (e.g., "Gain additional skills in audio description and participate in a worthwhile project" and "To improve my audio description skills"). Other statements of these values involved skill acquisition in service of job improvement (e.g., "I work in the A/V department and our videos require Audio Description [*sic*] and I would like to learn all that I can about it and get better at it," and "This project would help me understand the process for audio describing and why it is important [*sic*] and my supervisor thought it would be a good learning opportunity"). Much like Hedonism, another inwardly-focused value, Self Direction-thought often was mentioned with other values: in 13 of the 27 Self Direction-thought codes, participants signaled it as a value with other values.

The remaining values did not come up as frequently as Self Direction-thought and Universalism-concern. Benevolence-caring emerged in 11 responses. This value encompasses a devotion to the welfare of in-group members and appears in statements such as:

> As a person who has limited amounts of vision, I know how important it can be to have audio descriptions of things that I can't see. I want to give back since I have some vision and can provide input based on my personal experiences or those of my peers.

In a few instances, participants noted relational and connective aspects of the experience, such as ". . . I so enjoyed working with everyone [*sic*] and I wanted to take this opportunity to help another team" and ". . . I hope to get acquainted with another group of wonderful parks people, in this case some folks from Louisiana. . . ." The expressed desires to connect and participate were categorized as Benevolence-caring, though not a perfect fit, and we eventually consulted with Schwartz directly about this issue (presented in the Discussion section).

Hedonism, which encompasses pleasure and sensuous gratification (including mentions of fun and enjoyment), was often cited with other values: of the nine times Hedonism was identified, seven occurred alongside other values. Even in the two statements where it received the sole value code—one being "I have been part of this since Descriptathon 5, and it is educational and somewhat enjoyable"—the participant cited peripheral reasons (e.g., educational).

Universalism-tolerance, the desire to understand the perspectives of other people, emerged in statements such as, "I like to help those with vision impairment to better understand what is before them." In three of five statements, this value was one of a cluster of values.

Stimulation as a value was presented often in a straight-forward manner, such as "I was intrigued by the project and wanted to be part of it" and ". . . it sounded very interesting. I'm up for a challenge to see what this is all about."

Conformity-rules focuses on compliance with rules and laws (a sense of obligation) and appears in declarative statements such as, "Since 2000, I've been involved in federal government efforts to ensure that information and communication technology (ICT) is accessible and 'Section 508-conformant'. . . ."

Regarding Self Direction-action, two statements needed further discussion, and this code was added in response. The two coders decided that the outlier statements ("I am blind" and "As a blind woman, AD plays a significant role in enabling my participation in, and enjoyment of, the world around me. It brings visual texture, depth and colour to my generally dark world helping me think visually, see and experience the world as multidimensional") both fit the value of Self Direction-action. This value focuses on freedom and independence as well as the ability for one to have agency in making decisions.

Descriptathon Activities List Findings

The website hub that centralized and organized the online D8 event included a dynamic to-do list. For the most part, participants used this to-do list to guide what, how, and when they completed tasks. This list was generated by the event's organizers, without an opportunity for participants to influence it, so we reflectively wondered what values we encoded in the list and how well it matched the values expressed by our participants.

We were interested in how the values in our Descriptathon reward system matched our participants' stated values. We sought to analyze connections between the rewards (points) and the values participants came into the Descriptathon hoping to activate; RQ2 explored these values. D8 had 162 distinct activities during which participants could earn points. Most of those activities were generalized and open for anyone to claim, but other activities were designed to reward blind or low-vision participants for doing extra work, such as judging descriptions in the tournament. A few rewards were added at the last minute, rewarding particular people based on their specific situations (e.g., persevering through the training despite an urgent family health crisis, labeled "Grit Points—When faced with adversity, does she quit? No! She digs in, with grit.").

We started the second stage of data collection with a codebook containing the eight values identified in pre-Descriptathon survey results. After an initial perusal by the lead coder, we added the value of Achievement to the culled list, resulting in nine relevant values for this data. Every activity could be considered an "achievement," which would dilute meaningful information. Thus, the coders looked inside the content of each activity to better understand what it represented. The second coder was employed to establish reliability. As she was familiar with the values typology, and as a blind participant in D8, she brought insights to coding these statements that helped to clarify intent, interpretations, and practical implications of the activities. Unlike the first dataset, which had statements with multiple value codes, all D8 activities (the second phase) contained and were coded as representing a single value.

To establish reliability for this dataset, 30 activity descriptions were analyzed independently by both coders. Intercoder reliabilities were sufficiently strong, as indexed by Cohen's kappa ($\kappa = .62$); the percentage of agreement between the two independent coders was 72.3%. As many of the activities were repetitious (e.g., "Training—Read the About Page," "Training—Read the Academy Page"), a single difference on how to label a code could result in a large reliability discrepancy. After the above reliabilities were established, the coders conferred on how to handle particular statements and how they could relate to specific value(s). The second coder then independently coded the remaining statements.

In this dataset, the newly added value of Achievement accounted for nearly one half of the value codes for the badges (78 total). Achievement values include success according to social standards, such as winning something. Achievement values motivate people to compete and seek admiration for their success. In other instances, an action is done for the sake of the action or completion. Most badges rewarded people for completing a specific requirement, such as "Roll Call: Everyone Provided Audio-Described Profile Images" and "Completed the D8 Survey of Participants."

Self Direction-thought accounted for 33 (20%) of the value codes, which primarily rewarded people for completing some type of optional training (e.g., "Training-Description Practice" and "Training Best Practices").

Hedonism emerged in the activities that rewarded sharing things digitally, given the pleasure people experience when sharing on social media and receiving feedback such as likes and views (e.g., Cino et al., 2020; Quan-Haase & Young, 2010; Yoon et al., 2021). These activities include "Shared Descriptions—with Instagram Audiences," "Shared Descriptions—with

Reddit Audiences," and "A Judge Ready to Share—Descriptathon 8: Round 1, An Artifact (The Challenge) Descriptions."

Self Direction-action values include instances when people exercise their choice, freedom, and autonomy in decision-making, which most often occurred in instances when they judged—e.g., "Judged Round 3-Third Match" and "Judged Round 4-First Match"—or when they directly helped to decide an outcome—e.g., "Tie-Breaking Skills: You Helped Us Break a Tie in the D8 Tourney (Thank you!)."

Stimulation values emerged through engagement (e.g., "Engagement—Large-Group Discussion Contribution" and "Engagement—Creativity").

Two other values appeared but only in negligible amounts. First, Conformity-rules involved activities acknowledging rule and social-norm following: in the "RSVPed the D8 Calendar Invites" and "Engagement—Deadlines." Second, Benevolence-caring emerged once in the aforementioned special category. Unexpectedly, despite being central to the values in pre-Descriptathon, Universalism-concern and Universalism-tolerance values were not reflected in D8 activity badges.

We established RQ3 to connect and compare values that motivate people before the Descriptathon with values the Descriptathon rewarded. Based on RQ1 and RQ2, the values that underly why people volunteer differed from the activities they earned on the D8 website. A chi-square test further confirmed this observation: $\chi 2$ (8, N = 264) 145.54, p <.001, V = .74.

The closest match between the values that participants brought to D8 and the values in the activities was Self Direction-thought. Hedonism also aligned, though not as closely. However, Universalism-concern, the most-common value indicated before the event, was not present in D8s activity badges. Likewise, no participants indicated Achievement as a value and yet almost one half of D8 rewards appealed to it.

Post-Descriptathon Survey Findings

On the final day of the Descriptathon, we surveyed participants on their experiences. We asked participants to rate nine categories of activities that organizers considered core to the event as "most valuable" or "least valuable," but with the option to choose more than one category to put into those designations. The two analysts independently coded the nine categories based on values, coming to complete agreement (see Table 3).

Table 3. Participants most- and least-valued aspects of the Descriptathon

Most Valuable (n = 232)	Value Represented	Least Valuable (n = 80)	Value Represented
Working/practicing with a team 51 (21.9%)	Self Direction-thought	Challenges (friendly competition) 23 (28.8%)	Achievement
Team discussions 31 (13.4%)	Benevolence-caring	Speakers (subject-matter experts) 14 (17.5%)	Self Direction-thought
Feedback from judges 27 (11.6%)	Achievement	Group discussions 12 (15.0%)	Benevolence-caring
Group discussions 25 (10.8%)	Benevolence-crying	Working/practicing individually 12 (15.0%)	Self Direction-thought
Speakers (subject-matter experts) 24 (10.3%)	Self Direction-thought	Quick descripts (practicing process) 10 (12.5%)	Self Direction-thought
Quick descripts (practicing process) 21 (9.1%)	Self Direction-thought	Feedback from judges 6 (7.5%)	Achievement
Challenges (friendly competition) 20 (8.6%)	Achievement	Team workshops 2 (2.5%)	Self Direction-thought
Working/practicing individually 17 (7.3%)	Self Direction-thought	Team discussions 1 (1.3%)	Benevolence-caring
Team workshops 16 (6.9%)	Self Direction-thought	Working/practicing with a team 0 (0.0%)	Self Direction-thought

The friendly competition Challenges were the most polarizing of these event categories, with about one fifth of participants saying those were the most valuable and one fifth saying those were least-valuable activities. This category was labeled as Achievement. Those friendly competition Challenges also unmotivated a large number of participants.

Working and practicing with a team received the most mentions for "most valuable," labeled as Self Direction-thought. Team discussions ranked second on the list, labeled as Benevolence-caring, and feedback from judges ranked third, coded into the Achievement category. In contrast, subject-matter-expert speakers (Self Direction-thought), large-group discussions (Benevolence-caring), working independently (Self Direction-thought), and Quick Descript practice sessions (Self Direction-thought) were rated as "least valuable" but only by about 10% of participants. In that comparison, between most and least valuable, a general sentiment favored small-group work and individualized feedback. On the other end of the spectrum, participants seemed to favor less the tasks approached at large-scale levels or ones that were done independently.

Gamified contests sometimes generated tension and simultaneous engagement. One participant wrote:

> Consider making the competition aspect optional, because points aren't necessarily motivational to everyone. . . . I think it may add stress or frustration, at least it did for me and a couple of people on my team. It doesn't correlate with either the quality of the work I want to do or the quality of my experience (learning something new with a really impressive group of people, having fun and engagement).

In contrast, in reference to the Challenges, another participant wrote:

> Super fun and stressful! Love love love it! I know many people complained about the time stressors. I loved it because it forced you to focus on the important things quickly. This eventually helps people realize that audio description doesn't have to take a long time. It's a quick accommodation that means so much! So, keep the time crunch!

Thus, participants had different perspectives of the competitive quality of the event structure.

DISCUSSION

The diverse and cloistered areas of knowledge involved in an interdisciplinary project—like ours—plus the epistemological methodologies of those different disciplines creates a chasm that is difficult for any research team to navigate (Flanagan et al., 2008). Around the rim of that deep and dark hole, disciplines of all sorts stake claims, nearby each other but distinctly separate while rarely venturing into the center together. By positioning participant values as a design concern co-equal to computer programming and chi-square construction and the other constructivist considerations in such a project, researchers are forced to explore ideas beyond typical scientific and engineering constructs while also supporting those grounded concerns as well.

Flanagan et al. (2008) express a commitment to values as purposes, ends, or goals of human action on their own but also acknowledge the concern that not all values are universal and easy to accommodate. Sometimes participants have conflicting values. Many values are localized in a particular construct and context; therefore, the design of an intervention requires localization to align with those values. From that perspective, values are conceptualized in a hierarchy of a thin set, which all humans share, and a thicker set that applies to particular contexts. Similar sentiments and concerns about effective localization strategies have been raised and debated in technical communication circles, parallel with a social-justice turn in the field this past decade (e.g., Agboka, 2013; Getto & Sun, 2017; Shivers-McNair, 2017).

Although our Descriptathon intervention succeeded from a variety of external perspectives, including inspiring the production of new Audio Description at public places throughout the US at NPS sites, this analysis shows that we can improve in matching participants' values with the objectives of our media-accessibility initiative. In terms of organization, managers of public places approach us about improving access to their sites. We do have a few sighted people who repeat the experience and participate multiple times, but for most, it has been a one-time event. That makes us wonder, as organizers, if a deeper focus on values and small-group team building, rather than the achievement of finishing brochure descriptions, could build a community committed to long-term participation. For the people in the Descriptathon who

are blind or have low vision, we also have a small core of devoted contributors, but for each Descriptathon, we must exert energy to recruit new participants from our target audience. Because they already are well versed in Audio Description, some repeat participants may see our learning modules on that topic as remedial or unnecessary. And when the production process begins, they are laboring in ways that do not necessarily tap into common Universalism-concern and Self Direction-thought values that might have greater appeal. By identifying the Descriptathon's current Achievement focus, we can understand better when participants develop a *been-there, done-that* perspective on the event. As an alternative, if we shift our focus in D9 toward participant desires and values, we hypothesize that we can forge longer-lasting relationships, improve retention, and reduce the efforts in each iteration to recruit new people.

To make this shift, we intend to rethink the Descriptathon process, from our initial recruiting messages to our event-ending survey. The key disconnects shown by this research are illustrated in two dramatic disparities on opposite ends of Tables 2 and 3. Our participants came to D8 with a relatively high percentage of values oriented toward Universalism-concern, and we offered them zero activities to engage with that value. On the other side, about one half of D8 activities were based on Achievement values, but none of our participants joined the Descriptathon with Achievement values in mind.

Another key finding of this study was the importance of the sociability aspect of the Descriptathon. D8 was conducted remotely during the COVID-19 pandemic, during which many people felt isolated. The pandemic might have skewed attention to some degree toward this aspect, but that said, volunteers expressed a high interest in participating in something greater than themselves, favoring teamwork, collaboration, and small-group interactions. This finding led us to examine the role of values more closely in sociability and the possible gaps in the current values conceptualization. We ended up coding most of the statements in this area as Benevolence-caring, but the statements did not always seem to fit how Schwartz et al. (2012) defined the value and appeared in a gap between values. We contacted Schwartz about our findings, and he acknowledged that sociability, as we defined the motivational component, was:

> Probably the closest fit, but people might have other motivations that you would also describe as sociability. A desire to connect (not "need," which does not refer to a value) with people may sometimes also be motivated by security or conformity or tradition. Even valuing Achievement may motivate a desire to collaborate when collaboration promotes one's achievement. (S. Schwartz, personal communication, February 8, 2022)

In that respect, the gamification elements of the Descriptathon could help to support values around sociability elements to bridge motivational gaps. If the Descriptathon is a game, then it is inherently social, and participants are—and need to be—socialized to play it. For example, they must learn the rules, work with teammates, and collaborate toward a common goal. As such, socializing is a critical part of establishing high-quality gameplay (Adams, 2014). Social factors create a fun experience, build team spirit, and give participants agency that they cannot possess on their own because they can collaborate on activities that they could not complete by themselves (Mildner & Mueller, 2016). However, most of the commonly used gamification techniques appear oriented toward personal achievement, personal enjoyment, and fun or rewarding independence of thought and action, and relatively few of them reinforce or reward collaboration, collective effort, or social inclusion (Usunobun et al., 2019, p. 5). We wonder what would happen if a gamification approach was more closely integrated and aligned with values research and its activities tailored more toward values expressed by participants. In the case of the Descriptathon, what would happen if we designed the experience to reflect and emphasize the most-common values that participants bring to the event, rather than primarily imposing our Achievement-oriented values onto the participants at-large? We intend to answer that question in D9.

In the bigger picture, particularly for readers who do not study Audio Description or host Descriptathons, this research model—which gathers individual values of participants at the entry point to any organized activities and then studies ways in which those sentiments are expressed and aligned, sufficiently or not, with the individual values of participants—could be applied to any type of workshop or training or classroom or committee. We perceived that quality of work relates to alignment of values, meaning that when individual values

are in alignment, the quality of the work produced by the individuals and the teams are higher. However, we did not explicitly test that relationship and other factors complicate description outcomes. That relationship, therefore, merits further testing.

We did not test the efficacy of gamification in general. Gamification as an approach has been both widely dismissed and vigorously embraced, in an intellectual clash of loosely defined abstractions that seem to avoid direct and empirical comparisons. We recommend those discussions ground themselves in practice-based research to truly determine the potential of gamification. Having tried this intervention once without gamification, and then seven times with gamification, our research team is voting with our design choices, fueled by the mostly positive responses of our participants. Gamification has potential. But the reality is more complicated.

To successfully and effectively gamify an event, participants must have a reason(s) to play the game. Not everyone wants to play, even if they support the cause. Gamification, from that viewpoint, can be a frivolous distraction. Yet, this research into individual values shows more to the dynamic.

Values as a variable not only add another layer of gamification insights but also add to the game's potency or deficiencies. If intervention designers can know shared values of their user/designer participants and then integrate opportunities to meaningfully express those values into the experiences, then the ramifications of such insights transcend any particular application of the idea or use-case scenario. Across user-experience studies, values could be identified with other variables and examined to better understand what people do and why. From what we have learned, game aspects, at least in terms of a social-justice intervention, need to be both fun and focused on the higher purpose for people to willfully play along.

ABOUT THE AUTHORS

Dr. Brett Oppegaard is an associate professor in the School of Communications at the University of Hawai'i at Mānoa in Honolulu, HI. His scholarship focuses on the study of media accessibility and locative media. In addition to *Technical Communication*, his research has been published in *IEEE Transactions on Professional Communication*, *Journal of Technical Writing and Communication*, and *Communication Design Quarterly*. He can be reached at brett.oppegaard@hawaii.edu.

Dr. Michael K. Rabby is a scholarly associate professor at Washington State University, Vancouver, in the Creative Media and Digital Culture Program. His research explores the intersections of the human experience with technology in a variety of contexts, including online relationships and mobile app usage. He has published research in the *Journal of Social and Personal Relationships, Military Behavioral Health*, *Digital Journalism*, and *Communication Studies*. He can be reached via michael.rabby@wsu.edu.

REFERENCES

Abt, C. C. (1987). *Serious games*. University Press of America.

Adams, E. (2014). *Fundamentals of game design*. Pearson Education.

Agboka, G. Y. (2013). Participatory localization: A social justice approach to navigating unenfranchised/disenfranchised cultural sites. *Technical Communication Quarterly, 22*(1), 28–49. https://doi.org/10.1080/10572252.2013.730966

Breuer, J. S., & Bente, G. (2010). Why so serious? On the relation of serious games and learning. *Journal for Computer Game Culture, 4*(1), 7–24.

Briscoe, G., & Mulligan, C. (2014). Digital innovation: The hackathon phenomenon. *Creativeworks London, 6*, 1–13.

Caillois, R., & Barash, M. (1961). *Man, play and games* (M. Barash, Trans.; 2nd ed.). University of Illinois Press. (Original work published in 1958).

Cechanowicz, J., Gutwin, C., Brownell, B., & Goodfellow, L. (2013). Effects of gamification on participation and data quality in a real-world market research domain. In *Proceedings of the First International Conference on Gameful Design, Research, and Application*s (pp. 58–65). https://doi.org/10.1145/2583008.2583016

Cino, D., Demozzi, S., & Subrahmanyam, K. (2020). "Why post more pictures if no one is looking at them?" Parents' perception of the Facebook Like in sharenting. *The Communication Review, 23*(2), 122–144. https://doi.org/10.1080/10714421.2020.1797434

Conway, M., Oppegaard, B., & Hayes, T. (2020). Audio description: Making useful maps for blind and visually impaired people. *Technical Communication*, *67*(2), 68–85.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining “gamification.” In *Proceedings of the 15th International Academic MindTrek Conference* (pp. 9–15). https://doi.org/10.1145/2181037.2181040

deWinter, J., & Vie, S. (2016). Games in technical communication. *Technical Communication Quarterly, 25*(3), 151–154. https://doi.org/10.1080/10572252.2016.1183411

Flanagan, M., Howe, D., & Nissenbaum, H. (2008) Embodying values in technology: Theory and practice. In J. van den Hoven & J. Weckert (Eds.), *Information technology and moral philosophy* (pp. 322–353). Cambridge University Press.

Foxman, M. (2020). Punctuated play: Revealing the roots of gamification. *Acta Ludologica*, *3*(2), 54–71.

Fryer, L. (2016). *An introduction to audio description: A practical guide*. Routledge. https://doi.org/10.4324/9781315707228

Getto, G., & Sun, H. (Eds.) (2017). Localizing user experience: Strategies, practices, and techniques for culturally sensitive design [Special section]. *Technical Communication, 64*(2), 89–94.

González-González, C. S., & Navarro-Adelantado, V. (2021). The limits of gamification. *Convergence, 27*(3), 787–804. https://doi.org/10.1177/1354856520984743

Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A formal approach to game design and game research. In *Proceedings of the AAAI Workshop on Challenges in Game AI*, *4*(1), 1722–1727.

Krippendorff, K. (2019). *Content analysis: An introduction to its methodology*. Sage.

Levitt, H. M. (2021). *Essentials of critical-constructivist grounded theory research*. American Psychological Association. https://doi.org/10.1037/0000231-000

Matamala, A., & Orero, P. (2016). *Researching audio description: New Approaches.* Palgrave McMillan.

Mildner, P., & Mueller, F. (2016). Design of serious games. In R. Dörner, S. Göbel, W. Effelsberg, & J. Wiemeyer (Eds.), *Serious games* (pp. 57–82). Springer. https://doi.org/10.1007/978-3-319-40612-1_3

National Park Service. (n.d.). Santa Monica Mountains [brochure].

Oppegaard, B. (2020). Unseeing solutions: From failures to feats through increasingly inclusive design. In J. Majewski, R. Marquis, N. Proctor, & B. Ziebarth (Eds.), *Inclusive digital interactives: Best practices, innovative experiments, and questions for research* (pp. 219–242). Access Smithsonian, The Institute for Human Centered Design, & Museweb.

Porras, J., Khakurel, J., Ikonen, J., Happonen, A., Knutas, A., Herala, A., & Drögehorn, O. (2018, June). Hackathons in software engineering education: Lessons learned from a decade of events. In *Proceedings of the 2nd International Workshop on Software Engineering Education for Millennials* (pp. 40–47). https://doi.org/10.1145/3194779.3194783

Prensky, M. (2007). *Digital game-based learning.* Paragon House. https://doi.org/10.1145/950566.950596

Quan-Haase, A., & Young, A. L. (2010). Uses and gratifications of social media: A comparison of Facebook and instant messaging. *Bulletin of Science, Technology & Society, 30*(5), 350–361. https://doi.org/10.1177/0270467610380009

Rennie, D. L. (2000). Grounded theory methodology as methodological hermeneutics: Reconciling realism and relativism. *Theory & Psychology*, *10*(4), 481–502. https://doi.org/10.1177/0959354300104003

Sackey, D. J. (2020). One-size-fits-none: A heuristic for proactive value sensitive environmental design. *Technical Communication Quarterly, 29*(1), 33–48. https://doi.org/10.1080/10572252.2019.1634767

Schwartz, S. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1–65. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S. (1999). A theory of cultural values and some implications for work. *Applied Psychology, 48*(1), 23–47.

Schwartz, S., & Bilsky, W. (1987). Toward a universal psychological structure of human values. *Journal of Personality and Social Psychology, 53*(3), 550–562.

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., Dirilen-Gumus, O., & Konty, M. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology, 103*(4), 663–688. https://doi.org/10.1037/a0029393

Seaborn, K., & Fels, D. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, *74*, 14–31. https://doi.org/10.1016/j.ijhcs.2014.09.006

Shivers-McNair, A. (2017). Localizing communities, goals, communication, and inclusion: A collaborative approach. *Technical Communication, 64*(2), 97–112.

Turnham, C. (2019). "Santa Monica Mountains" by National Park Service [audio]. https://bit.ly/UniD_SantaMonicaMountains

UniDescription. (n.d.). *Home.* www.unidescription.org

Usunobun, I., Anti, E., Hu, F., Habila, L., Sayed, R., Zhang, Y., & Tuunanen, T. (2019). Cultural values' influences on users' preferences for gamification techniques. In *ICIS 2019 Proceedings*. https://aisel.aisnet.org/icis2019/design_science/design_science/1

Van Berkel, N., Goncalves, J., Hosio, S., & Kostakos, V. (2017). Gamification of mobile experience sampling improves data quality and quantity. In *Proceedings of the ACM on Interactive, Mobile, and Ubiquitous Technologies, 1*(3), 1–21. https://doi.org/10.1145/3130972

Wilkinson, P. (2016). A brief history of serious games. In R. Dörner, S. Göbel, M. Kickmeier-Rust, M. Masuch, & K. Zweig (Eds.), *Entertainment computing and serious games.* Lecture Notes in Computer Science, 9970, Springer. https://doi.org/10.1007/978-3-319-46152-6_2

Yoon, G., Duff, B. R., & Bunker, M. P. (2021). Sensation seeking, media multitasking, and social Facebook use. *Social Behavior & Personality: An International Journal*, *49*(1), 1–7. https://doi.org/10.2224/sbp.8918

Exploring Localized Usability Implementation in mHealth App Design for Healthcare Practitioners in the Global South Context: A Case Study

doi: https://doi.org/10.55177/tc885177

By Keshab Raj Acharya

ABSTRACT

Purpose: This study was designed to better understand how mobile health applications (mHealth apps) designed in the Global North (GN) are perceived as usable, empowering, and persuasive by users, particularly healthcare practitioners, in the context of a Global South (GS) country.

Method: This article employed an online survey of users of a mHealth app that was designed and developed in the GN for global use. Survey participants included healthcare practitioners from a GS country and the survey was administered by snowball sampling method.

Results: Eighty-three survey responses from healthcare practitioners in Nepal were coded into three broad categories: user experience and mHealth apps, localized usability and mHealth apps, and persuasive design and mHealth apps. Their relationships and connections are examined within these categories.

Conclusion: From a user empowerment perspective, understanding the interest, motivation, and concerns of end-users is vital to the development and implementation of mHealth apps, especially in the low- and middle-income healthcare contexts in which healthcare practitioners have limited resources. Culturally sustaining localized UX approaches should be adopted to create usable, empowering, and persuasive mHealth apps for use in resource-constrained cultural settings in the GS.

KEYWORDS: mHealth apps, Localization,User empowerment, Persuasive design, Global South and Global North

Practitioner's Takeaway

- Technical communicators as healthcare practitioners need to pay attention to cultural aspects prevalent in users' sites in developing and evaluating UX of health-related tools for user empowerment and persuasion.
- Localized usability studies can provide insight into and act as a driving force for designing usable, empowering, and persuasive care-related tools that meet the needs and expectations of healthcare practitioners from other cultures.
- In designing such tools, practitioners in the Global North need to consider users in the Global South by addressing users' localized usability expectations and needs so the North–South divide can at least be reduced, if not eliminated.

Keshab Raj Acharya

INTRODUCTION

The widespread use of smartphone technology and mobile health applications (mHealth apps[1]) has significantly impacted global healthcare delivery systems. In addition to reducing existing patient care and treatment barriers such as provider workload, skills shortage, linguistic and cultural barriers, and geographical obstacles, mHealth apps have opened new avenues for improving health outcomes (Fiordelli et al., 2013). Aside from supporting traditional healthcare research, they are widely used as persuasive tools for clinical decision making, information management, and medical education and training (Sezgin et al., 2017). Such apps have constantly been utilized to manage chronic diseases, fitness, and wellness, as well as to build a participatory health culture that allows users to make informed decisions by promoting their well-being, preventing diseases, and assisting them with managing chronic illnesses (Adepoju et al., 2017; Pokhrel et al., 2021; Welhausen & Bivens, 2021).

Several mHealth apps, including Medscape, Epocrates, PEPID, UpToDate, and Doximity, are available for healthcare practitioners to enhance clinical practices. As mobile devices become more common in expanding global healthcare settings, apps like these are in high demand and being developed quickly (Wallace et al., 2012). These apps must meet user needs and expectations, especially in resource-constrained settings or contexts with "limited access to, or reduced availability of, resources" ranging from "robust bandwidth to electricity to literacy" (Rose, 2016, p. 433). In fact, usability is key in the adoption of mHealth apps (Gagnon et al., 2016)—i.e., individuals must be able to use such apps to achieve a specific purpose.

Scholars in healthcare fields have assessed the effectiveness of mHealth apps in the Global South (GS)[2] (e.g., Bhatta et al., 2015; Osei & Mashamba-Thompson, 2021; Pokhrel et al., 2021). Scholars in technical communication (TC) also observe how users experience such apps and attempt to identify users' functional and productive usability concerns (Welhausen & Bivens, 2021), suggesting that such tools be designed to address the UX needs in a complex healthcare system (Kirkscey, 2020). However, TC lacks research of localized usability implementation in contemporary health technologies—how Global South (GS) healthcare practitioners perceive, use, and experience these emerging digital spaces generated in the Global North (GN).

This article seeks to address this research gap by investigating the extent to which localized usability is implemented in an mHealth app designed in the GN to support healthcare practitioners around the globe. More specifically, the article addresses concerns related to localized usability for user empowerment and persuasion by analyzing survey data collected from Medscape app users (i.e., healthcare practitioners) in Nepal, a small landlocked country between China in the north and India in the south. Nepal was chosen because many of the author's colleagues who are healthcare practitioners in Nepal expressed dissatisfaction with the design of northern mHealth apps like the case app in this study—the Medscape app.

For this case study, localized usability is defined as the degree to which local practices and values are incorporated into health-related tools (such as mHealth apps, medical devices, medical software, and print or online care-related documents) for a user from another culture (Acharya, 2018; Esselink, 2000; Sun & Getto, 2017). The results from this study can inform TC practitioners and researchers about how localized usability of mHealth apps can improve health efficiency and effective use of care-related tools, including mHealth apps, for problem solving and decision making in resource-constrained situations.

ABOUT THE MEDSCAPE APPLICATION

Developed by WebMD (medscape.com), an American corporation and leading online publisher of health and well-being information, the Medscape app was developed for global use. As a comprehensive resource for medications, diseases, and medical calculators, the app features the drug database, blogs, a checker for drug interactions, a directory of pharmacies and physicians, and more (Lazakidou & Iliopoulou, 2012). The app provides:

- Immediate clinical answers, including prescription and over-the-counter (OTC) drugs, herbals, and supplements
- Latest medical and health information, including the Food and Drug Administration (FDA) approval alerts and expert commentaries

Exploring Localized Usability Implementation

- Consultations with experts, exclusively for healthcare practitioners
- Medical education activities including mobile courses for continuing medical education (CME) credits
- Personalized Activity Tracker to monitor educational progress and credits earned. (WebMD LLC, 2022)

Both Android and iOS users can download the app for free but they must register. More than 5 million users have downloaded the app from the Google Play store (Google Play, 2022).

Users have unlimited access to the entire Medscape network of sites and services for free. The app provides information on more than 8,500 prescriptions and OTC drugs, herbals, and supplements (WebMD LLC, 2022), and its version (9.2.10 as of this writing and 9.2.9 in November 2021) (Apple Store Preview, 2021) and database are updated regularly (Ming et al., 2016). The app can be used to ask questions, share cases, learn from others, and interact with a global community of healthcare practitioners. As the app includes a drug reference tool with current prescribing and safety information, it provides users with recent global medical and health issues. As for the clinical updates, the app is the most recommended mHealth app that offers free CME activities and medical news (Ming et al., 2016).

This app was chosen because the app was designed and developed within the GN context; it is used by healthcare practitioners in Nepal (Chaudhary et al., 2019); and both Android and iOS users can download the app for free. The app offers news from the Medscape website while keeping healthcare practitioners informed about the latest medical and health information (Phillips & Thornbory, 2014); it gathers recent medical research articles into a single, easy-to-use platform for healthcare practitioners worldwide.

LITERATURE REVIEW

Recent usability research and practices in TC have highlighted our field's needs to critically examine usability in relation to promoting social justice (Acharya, 2018; Jones & Williams, 2017); user empowerment (Ladner, 2015; Opel, 2014; Walton, 2016); user engagement (Roy, 2013); accessibility (Hitt, 2018; Oswal, 2019); and user advocacy (Jones et al., 2016; Martin et al., 2017; Rose, 2016). In addition, scholars have addressed usability with regard to sociocultural issues, including translation and multicultural user experience (UX) (Cardinal et al., 2020; Gonzales & Zantjer, 2015); cultural sensitivity (Sun & Getto, 2017); and context of use (St.Amant, 2017a). Scholars also recognize the growing need to create technical materials or tools that address user expectations in international contexts (e.g., Gu & Yu, 2016; Saru & Wojahn, 2020).

Localization is the process of designing an information tool to satisfy the needs of a specific target market or country (Hoft, 1995). Localization has been described as the process of adapting content to address linguistic and cultural expectations of specific cultures in specific contexts (Batova & Clark, 2015). User localization involves focusing on strategies and activities that users adopt when they communicate to meet their culturally-specific needs and expectations (Sun, 2012). Developers, understanding user-localization, can design technologies to meet user needs in localized contexts (Gonzales & Zantjer, 2015). When designing healthcare tools for healthcare practitioners across culturally situated local contexts, localization efforts should target users' sociocultural systems, behaviors, and environment of use. Thus, localization entails contextualizing health-related tools to improve the lives of users, including underserved and underprivileged healthcare practitioners in the GS.

As global markets for technical materials expand, developing medical and health tools that meet the localized usability expectations of other cultures is becoming increasingly important (Acharya, 2019; St.Amant, 2017a, 2017b). Given the global expansion of technical communication, researchers have stressed the need for developing localized medical and health materials to improve the lives of multicultural users (e.g., Batova, 2010; St. Germaine-McDaniel, 2010; Zhu & St.Amant, 2007). To be more effective, health-related tools should be designed to support users' knowledge and experiences from other cultures. One way of responding to the needs of local users in various contexts is designing such tools with those users as co-designers who can offer "valuable user input" in the locally situated cultural context (Andrews et al., 2012, p. 139). Collaborating with local users means learning from them, in addition to sharing their frustration, pain, and discomfort with the designers (Acharya,

2018). Partnering with users has many advantages, such as a better understanding of just futures and how to work collectively to build those futures (Dombrowski, 2017). In essence, designers can engage in socially just design for inclusion and user empowerment through user participatory design practices—to conduct their work ethically.

Designers of healthcare tools, including mHealth apps, should strive to design not just for healthcare practitioners but also with them: to establish a direct relationship with users as co-designers and, as a result, adopt an effective design approach and allow democratic and participatory engagement (Ehn, 1992; Spinuzzi, 2005). Working closely with users by implementing the participatory civic engagement model allows designers to reflect on users' needs and desires through an iterative process.

Individuals' contexts for utilizing healthcare tools can differ per culture, and these differences have important implications for design (Acharya, 2019; St.Amant, 2017b). To accommodate expanding multicultural and multilingual global health contexts, conventional design approaches might need to be modified and improved. For these reasons, many researchers in TC have developed contemporary design frameworks to understand the importance of culturally localizing content (Batova & Clark, 2015; St.Amant, 2021; Sun, 2012, 2020). St.Amant (2017b) proposed the script-prototype approach for the study of UX with care-related tools across national and cultural boundaries. Because scripts influence the way audiences conceptualize messages, they can significantly impact communication in healthcare settings (St.Amant, 2021).

When designing for global audiences, Sun (2020) has developed the "culturally localized user experience (CLUE)" approach for global engagement and empowerment, which is renamed "culturally localized user engagement and empowerment (CLUEE)"—the CLUE^2 (CLUE-Squared) approach (p. 6). Although the CLUE approach helps designers integrate different design aspects into products for locally situated cultural contexts, the CLUE^2 framework sees design as a mode of sociocultural inquiry as well as a force for social activism (Sun, 2020). Adopting the CLUE^2 approach can enable app developers to design mHealth applications for user empowerment by bridging "cultural differences with design intervention" in an international context (p. 7).

Culturally sustaining localized UX approaches are critical in the design of care-related tools to ensure improved healthcare quality and safety. However, many tools are designed without such approaches and thus are difficult to use and have poor user interfaces (Zhang et al., 2003). Essentially, localized UX approaches involve creating interfaces, including mHealth apps, that are usable (effective and efficient), empowering (accessible and supportive), and persuasive (credible or trustworthy) to culturally diverse users in our increasingly globalized world.

Informed by Fogg's (2003) theory of persuasive technology, interactive design can change users' attitudes and behaviors—in a word, persuasion. For Fogg, persuasion is a noncoercive attempt to change another person's attitude or behavior, or both. Fogg (2003) presented seven attributes for developing persuasive technology tools that can change users' attitudes and behaviors:

- Reduction: to simplify the task sequence required to achieve a desired objective
- Tunneling: to guide a user through activities with specific instructions
- Tailoring: to design information that is compatible with the users
- Suggesting: to suggest actions to the user at the right moment and context
- Self-monitoring: to enable users to track their own behavior
- Surveilling: to observe users overtly to increase a target behavior
- Conditioning: to rely on providing reinforcement (or punishments) to the user.

As persuasive tools, mHealth applications can influence attitude and behavior changes by increasing self-efficacy and providing tailored information (Fogg et al., 2009).

Self-efficacy describes how users believe in their ability to successfully act in a domain, and tailored information provides content that is relevant to their needs. Tailored information can lead to a greater change in behavior and attitude (Dijkstra et al., 1998; Strecher, 1999).

METHOD

This case study examines the extent to which the Medscape app was designed for user empowerment and persuasion in the GS context. Case studies allow

researchers to explore in-depth single or multiple units of study (Creswell, 2009), as cases are bound by time and activity, and researchers gather detailed data by employing methods such as interviews or surveys (Stake, 1995). Case studies have proven useful in TC in comprehending complex systems and embodied UX during the development and testing of healthcare tools (Arduser, 2018; Kennedy, 2018; Kirkscey, 2020).

This case study was guided by the following research question: In the development and UX evaluation of health-related materials or tools for user empowerment and persuasion, how can TC practitioners address the needs of healthcare practitioners in the GS context?

To address this research inquiry, I employed a survey to elicit responses from a specific pool of Medscape app users—especially healthcare practitioners—in Nepal. After gathering surveys, I completed qualitative analysis by coding responses.

In surveys, questions are pre-defined to collect information from people (Dillman et al., 2014), with the goal of maximizing response rates and accounting for nonresponse bias (Fink, 2017).

An online survey was employed because of its benefits, including lower cost, faster response time, flexibility, ease of data entry, and control over the format (Granello & Wheaton, 2004) and because it may allow researchers to gain access to populations that otherwise might not be possible (Wright, 2005).

I incorporated snowball sampling through social media: to recruit participants who are not accessible or who do not know the researcher (Marcus et al., 2017; Naderifar et al., 2017) and to expand the participant pool by having participants connect me with potential participants.

Potential users of the Medscape app were contacted via email, phone, and social media messaging platforms; the two inclusion criteria were healthcare practitioners, including medical students, in Nepal and users of the Medscape app for at least one month.

For this IRB-approved study, I designed and administered 25 survey questions using the Qualtrics survey instrument (see Appendix). I am unsure how many potential participants saw the invitation, so a response rate cannot be determined. A total of 88 participants took part in this study, but three did not complete the survey and two did not meet the inclusion criteria; therefore, the analysis is confined to 83 participants' responses as data sources.

Using an Excel workbook, the data corpus was unitized (segmented for analysis), sampled (selected an acceptable number of texts to analyze), and validated (used a consistent coding system) for emerging and recurring themes (Boettger & Palmer, 2010). Informed by Flick's (2018) coding procedure, I utilized the stages of open, axial, and selective coding. Although open coding was performed to generate conceptual categories, axial coding was done to refine theme categorization. Using selective coding, the core category was determined, relating it with other categories derived from axial coding. I did not employ secondary raters because I was not attempting to quantify the data, but to draw connections between the data points. Though I acknowledge that this may be a shortcoming, additional raters are no guarantee of reliability or validity (Armstrong et al., 1997).

I examined each response and considered its implications at a larger scale, seeking to avoid bias. At times, different categories appeared to be similar but were, in fact, quite different. If a phrase or term fit into more than one category but had nothing else to accompany it, I kept that content in the category with related terms or phrases. In so doing, I grouped related phrases in their own category that otherwise would be scattered throughout the results without context for analysis.

RESULTS

To address my research question, I analyzed and coded participants' survey responses to derive themes and grouped them into three thematic categories: user experience and mHealth apps, localized usability and mHealth apps, and persuasive design and mHealth apps.

The first step was to analyze the collected data to gain a better understanding of the study participants' demographics. Of 83 respondents who indicated their gender, 34 (41%) were female and 49 (59%) were male (Table 1). Respondents reported ages from 18 to 50 years. Among the participants, 44 (53%) were younger than 30 years, 33 (39.8%) were younger than 41 years, and six (7.2%) were 41–50 years.

Table 1. Demographic characteristics and frequency of using mHealth apps

Demographics	N (% with rounded decimal values)
Gender	
Female	34 (41.0%)
Male	49 (59.0%)
Age (in years)	
18–29	44 (53.0%)
30–40	33 (39.8%)
41–50	6 (7.2%)
Current Professional Status	
Anesthesiologist	9
Clinical pharmacist	5
Consultant dermatologist	1
Consultant physician	3
Consultant intensivist	3
Consultant psychiatrist	1
Consultant surgeon	4
Dental surgeon	2
Endodontist	2
Health assistant	1
Medical officer	10
Medical student	29
Microbiologist	1
Nurse	6
Pediatrician	6
Education	
Doctor of Medicine (MD)	27
Doctor of Pharmacy	3
Master of Pharmacy	2
Master of Dental Surgery	2
Bachelor of Dental Surgery	2
Bachelor of Medicine and Bachelor of Surgery (MBBS)	11
M.Sc. Nursing	2
B.Sc. Nursing	4
Pursuing MBBS	29
Certificate in General Medicine	1
Frequency of using mHealth Apps other than the Medscape app	
Always	20 (24.1%)
Very often	39 (47.0%)
Sometime	19 (22.9%)
Rarely	5 (6.0%)

Participants' current occupations varied widely. Twenty-nine were medical students pursuing an MBBS degree, and 54 were healthcare practitioners from different departments, including anesthesia, dermatology, critical care, psychiatry, surgery, pathology, dentistry, pediatrics, pharmacy, and ophthalmology. Nine nurses and 10 medical officers also took part in the study.

As for other mHealth apps, 20 participants (24.1%) always utilize them, 39 (47%) very often, 19 (22.9%) sometimes, and five (6%) rarely. Although nine participants (10.8%) mentioned using a locally designed mHealth app called DIMS Nepal, 23 (27.7%) reported using UpToDate, which was designed and developed in the GN for worldwide use. Five participants (6%) indicated that they use only the Medscape app. Thirty participants (36.1%) utilize this app many times a day, six (7.2%) use it once a day, 19 (22.9%) many times a week, 18 (21.7%) once or twice a week, and 10 (12.1%) use the app on a weekly basis. These data support Chaudhary et al.'s (2019) findings that the Medscape app remains popular among healthcare practitioners in Nepal.

User Experience and mHealth Apps

Enhancing UX requires understanding the ways technical tools are designed for persuasion and how the choices they offer position a user to act in the context of use (Lauer & Brumberger, 2016). Health-related tools designed with the user in mind increase the likelihood of adoption and the impact of actual use (Alsswey et al., 2020; St.Amant, 2017a). To better understand users' perspectives on the design of information in the case app, participants were asked if the information was designed to meet their needs and expectations in their cultural contexts. Nineteen (23%) participants strongly agreed on the design of information for the healthcare practitioners who need to use it, 51 (61.4%) moderately agreed, and nine (10.8%) responded as neutral, but four (4.8%) participants expressed some disagreement with the design of the information (Figure 1). One participant stated, "I would like to say that this app does not provide information in short and in a clear manner." Implicitly indicating the localized usability issue associated with the design of information, one participant expressed:

> Information should be presented in ways that we could use it based on our geographical location. For example, if the app prioritizes information based on diseases endemic in a particular geographical

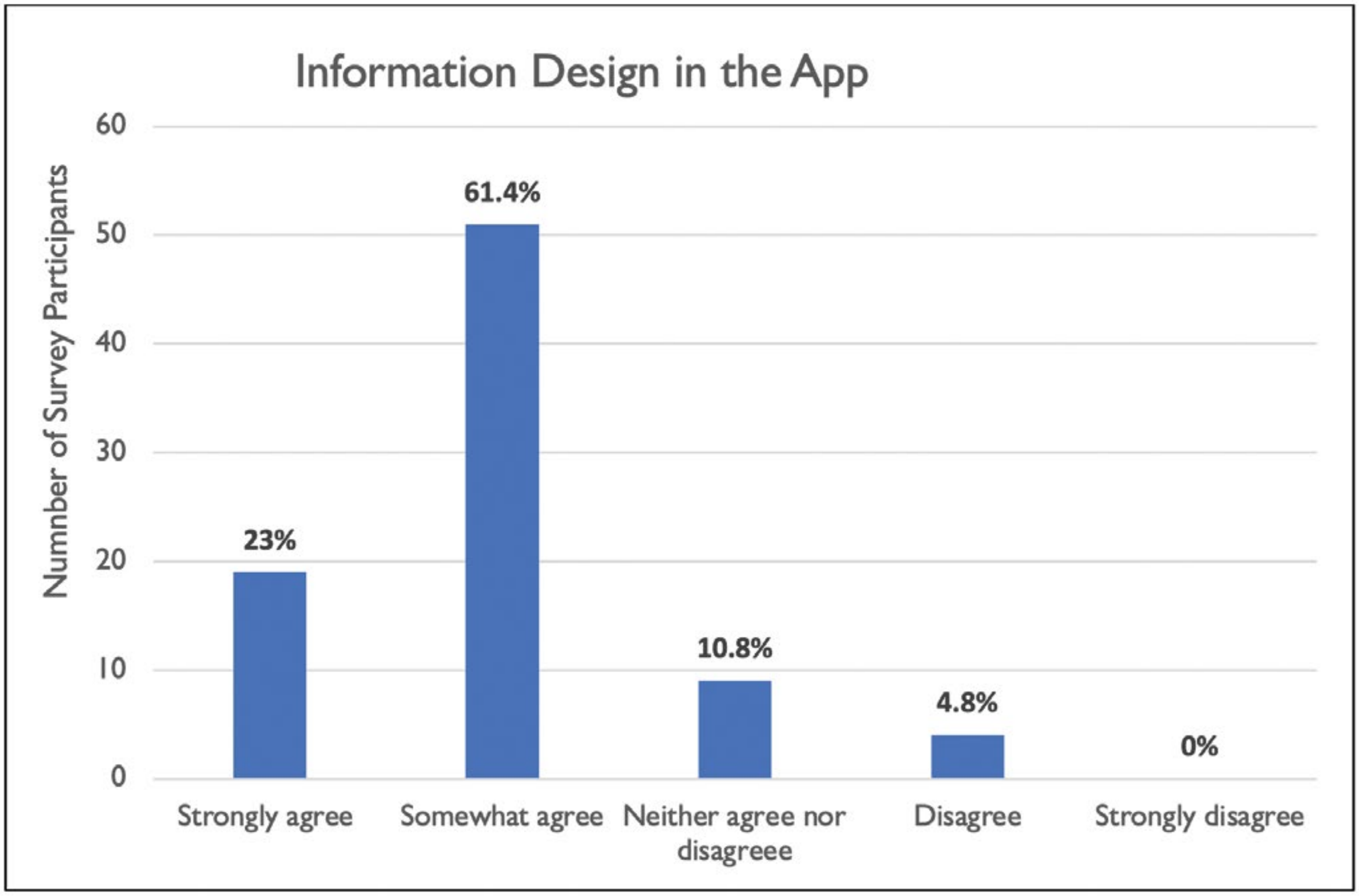


Figure 1. Survey participants' perspective of app design

> region, it could be easy and simple for us to use the app during a public health crisis in our country.[3]

Similarly, two participants mentioned the vagueness of information and one noted that it is "too difficult to find out what is needed in the critical or urgent care situation." Another expressed dissatisfaction regarding the design of information: "I cannot find all the information I need on a country-by-country basis." What works in one culture may not work in another.

Because user satisfaction is a key attribute of usability (Barnum, 2011; Nielsen, 1993), participants were asked how satisfied they were with the case app's performance and design in their immediate environment. Twelve (14.5%) participants were extremely satisfied with the app, 56 (67.5%) were moderately satisfied, eight (9.6%) were neutral, and seven (8.4%) were somewhat dissatisfied (Figure 2).

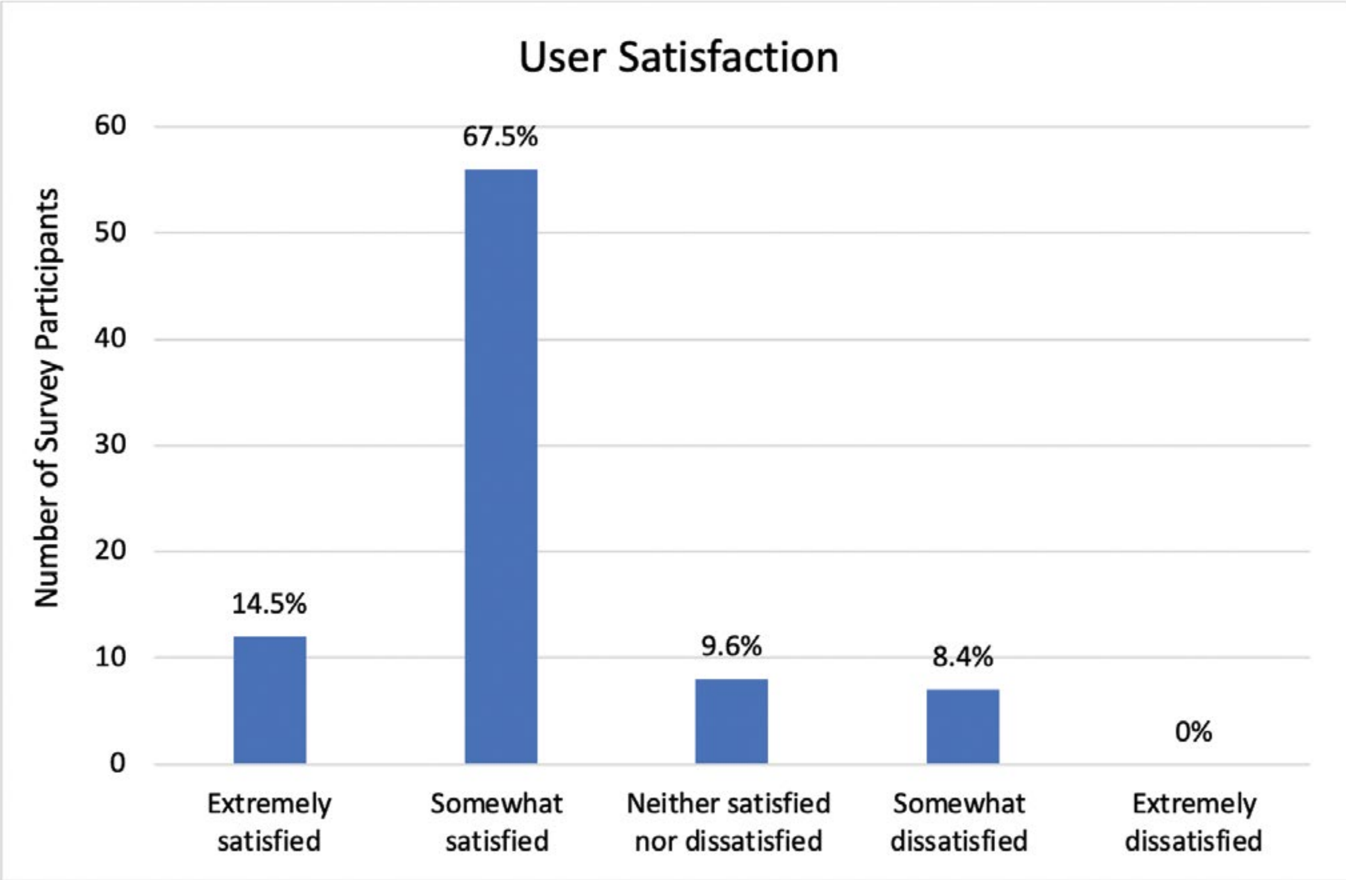


Figure 2. Survey participants' overall satisfaction with the design of the case app

Though most participants were relatively satisfied, the main concerns of user discontent are the requirement to log in and the lack of up-to-date information. One participant mentioned:

> The app is not updated with the latest classifications of drugs, and it does not include some newer classification of drugs. I am a little bit concerned with the information about Drug-Drug Interaction. Information about the pharmacokinetics of drugs is somewhat lacking.

Similarly, another participant expressed dissatisfaction: "Sometimes the app does not work when needed. It gets too slow at times." Thus, when creating mHealth apps as persuasive tools for healthcare practitioners in the GS, developers in the GN need to pay attention to both organizational visions for information design and an action plan for achieving it for localized usability and user empowerment.

Localized Usability and mHealth Apps

mHealth apps can play a significant role in supporting healthcare practitioners in southern low- and middle-income countries by changing the standards of healthcare services and opening new opportunities (Osei & Mashamba-Thompson, 2021; Pokhrel et al., 2021). As part of the localized usability implementation for effective healthcare services, participants were asked about the installation and operation of the case app on their devices. Thirty-two participants (38.6%) found it easy, 36 (43.4%) were neutral, and eight (9.6%) found the setup process rather difficult (Figure 3). Four (4.8%) participants mentioned that the app was easy to set up, whereas three (3.6%) rated it as very difficult (Figure 3). Regarding the app's functionality, nine participants (10.8%) reported that the app crashed frequently on their phones, 41 (49.4%) had a moderate view of the issue, 26 (31.3%) rarely faced this problem, and seven (8.4%) had no such issues. Considering whether participants preferred the Medscape app over

the Medscape website or both, 59 participants (70.1%) preferred the app, whereas seven (8.4%) favored the website; 17 participants (20.5%) selected both, stating that "the website is easy to navigate," they do not have "enough memory on [their] phones" to download the app," and that they "mostly use PC" because "it is much easier to look up more information on the website." One participant noted that it was "easy to open more than one page simultaneously on the website."

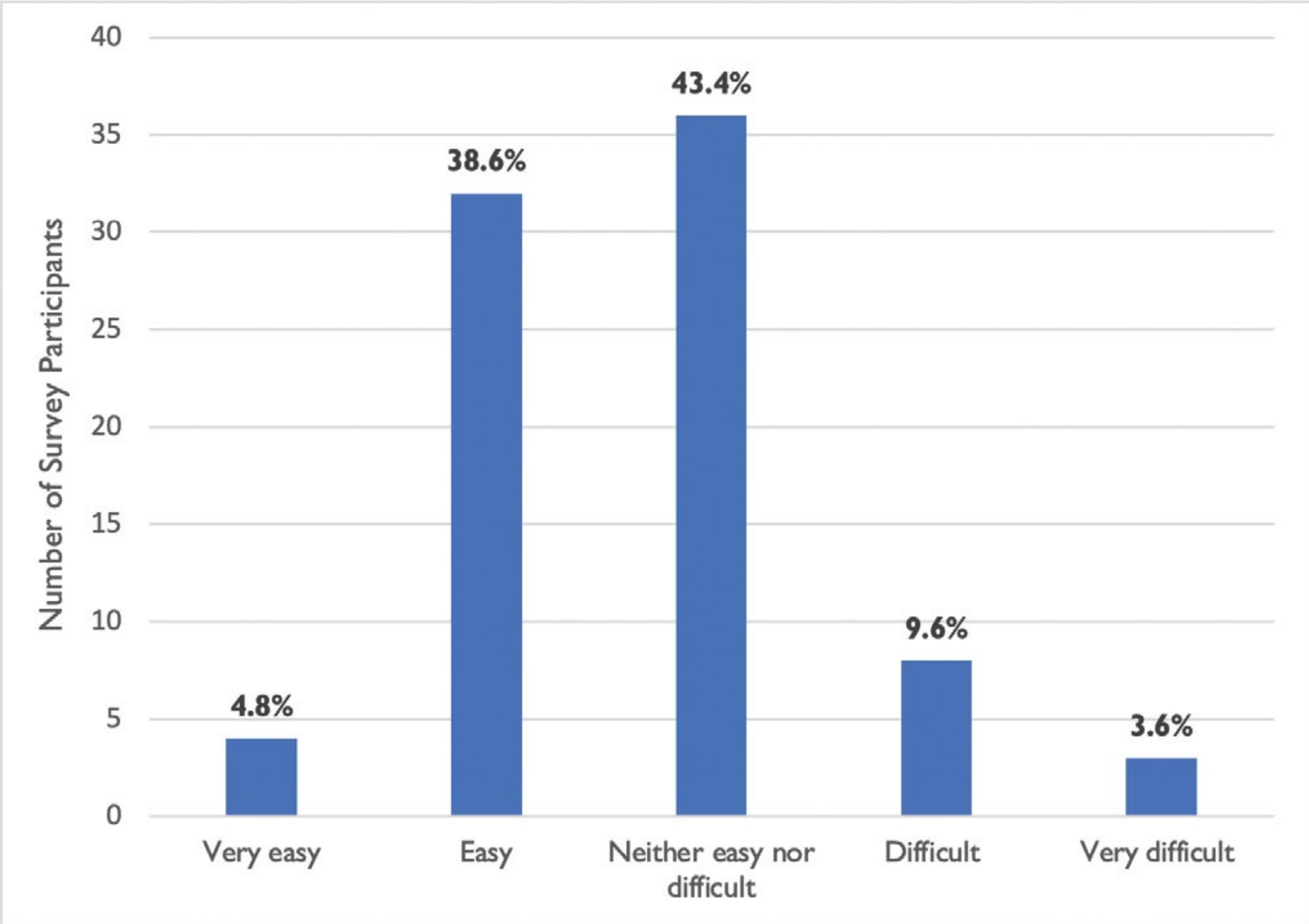


Figure 3. Survey participants' perception of ease of use on their devices

Participants reported various reasons for using the app by selecting all applicable options. Although 50 participants (65%) utilized the app to find evidence-based information for effective patient treatment, 24 (28.9%) used it to provide immediate care and health support. Likewise, 49 participants (59%) considered the app a persuasive source of health-related information and 38 (45.8%) indicated its use for making quick decisions in critical care situations.

In discussing how the case app was designed for users, especially healthcare practitioners, from other cultures, one participant emphasized the importance of having detailed information over the app's attractiveness: "I do not think app designers need to make it attractive for users because we mostly use this app for getting health and medical information. Inclusions of all recent updates would make this app more reliable." Indicating the issue related to localized usability implementation in the app, another participant stated:

> To make it more user-friendly, the app should keep its free subscription and consider summarizing key findings in a catchy way. App designers can make it evidence-based by incorporating the major impactful recent clinical trials or system reviews.

> Other features such as "drug dosing for specific patients or populations" should be added to the app.

The development of mHealth apps with persuasive features that address specific concerns of users, particularly healthcare practitioners, in the GS context can lead to increased localized usability. In short, the presence or absence of a single design feature can have a significant impact on the usability and persuasiveness of an mHealth app in a different cultural context.

Persuasive Design and mHealth Apps

As mHealth apps are gaining more popularity for promoting beneficial behaviors, their design and functionality become increasingly important in persuading healthcare practitioners to use them (Shati, 2020). Beneficial behaviors, in my case study's context, relate to healthcare practices and activities. Because credibility or reliability is critical for the design of persuasive systems (Fogg, 2003), design flaws can easily result in irreversible losses of perceived source reliability in health technologies or tools.

To better understand GS healthcare professionals' perception of credibility when using the case app, participants were asked if they found the information credible. Twenty-five participants (30.1%) strongly agreed, 52 (62.7%) moderately agreed, and six (7.2%) were neutral. Despite some participants' concerns associated with information reliability, the results show that the case app was generally perceived as a credible source of information: "This app is very credible, easy to use, and can be operated when the internet is available." However, concerns about the app's credibility include a lack of up-to-date and detailed information for users in specific localities: "The app does not provide up-to-date information as quickly as other apps like UpToDate. It also does not provide detailed information about many topics for healthcare workers like us in Nepal." The lack of updated information regarding current medical advances, as discussed by another participant, raises concerns about the app's credibility in the GS context:

> Not all medicines are included in the app. Broader information in the app would help us find information accurately in countries like Nepal. Information about new medicines should be available immediately in the app so that we can know what is going on in our field around the world. This also increases the app's credibility.

As these findings imply, providing detailed content information in mHealth applications can boost persuasion and improve UX in the locally situated GS context.

To enhance localized usability for user empowerment and persuasion in the low- and middle-income healthcare context, mHealth app developers in the GN can consider design principles proposed by Fogg—especially reduction, tunneling, and tailoring. Implementing these principles in mHealth app design, however, differs depending upon the app type, as well as the cultural context where it will be used. These three principles are the most studied design principles for persuasion (Al-Ramahi et al., 2016).

Reduction

Reduction tools make "a complex task simpler" by "reducing a complex activity to a few simple steps (or ideally, to a single step)" to achieve certain goals (Fogg, 2003, p. 33). In my case study, 10 participants (12%) complained about having to log in every time to access information. One participant stated, "I hate having to sign in every time using my email and password." Another participant expressed a similar sentiment: "Do not ask for the username and password again. I forget them every time." Discussing the lack of specificity of the information in the app, one participant mentioned, "At times, the app provides too vague answers, making it hard to find out the information that I need."

The app's usability can be improved by simplifying tasks or reducing unnecessary steps so that app users, especially healthcare practitioners in the GS, can access information quickly and easily.

Tunneling

Adopting the tunneling design principle allows designers to reduce uncertainty by guiding "users through a predetermined sequence of actions or events, step by step, to encourage certain" beneficial behaviors (Oinas-Kukkonen & Harjumaa, 2018). Like reduction tools, tunneling tools aim to increase self-efficacy and facilitate goal completion by sequencing tasks to reduce the user's cognitive load—the amount of mental effort required to complete a task. Participants also indicated the issues associated with tunneling in terms of guiding users through a set of tasks in a specific order to achieve a goal. As one participant noted, "I think data and information should be kept with references to standard

textbooks so that I can consult them if I need." Another one reported that "information should be organized more effectively, and sections should be summarized and placed in the appropriate location based on user needs, so that users can find, understand, and use them quickly and easily with a minimal learning curve."

As a result of applying the tunneling principle during the design process of mHealth apps, developers can simplify the overall process by reducing cognitive load on healthcare practitioners and, thereby, improve the localized usability of such apps for user empowerment and persuasion in southern healthcare contexts.

Tailoring

Tailoring is a way of designing information in a system or tool that is compatible with a user's educational, cultural, and social background. Users are more likely to utilize systems or tools that are tailored to their needs, personalities, usage contexts, and other characteristics (Al Ayubi et al., 2014). Expressing their concerns related to tailoring tools, six participants (7.2%) reported having difficulty connecting to the Internet to access information. One participant noted that "all topics are unavailable when offline, and [that] the app takes up a significant storage space on mobile devices."

Participants also mentioned the issue of localized usability and user empowerment. One participant suggested "adding more updated videos related to procedures on a country basis" and another mentioned the issue associated with "not being able to download information when needed to use without internet connection." Participants also complained that they could not access content if they were offline, and that the information was insufficient. One participant said, "Please make all contents available offline and as a pediatrician we need more detail on management part regarding the doses which is sometimes difficult to find even searching on the Internet." Another participant suggested that "frequently used sections [be] tailored individually."

These responses highlight two key localized usability issues that are consistent with how another participant stated it succinctly when commenting on what annoys the user about the app: "trade names of drugs available in US/Canada and content unavailable when offline."

Thus, participants reported a broad range of localized usability aspects to be considered to design usable, empowering, and persuasive mHealth apps for southern healthcare practitioners. Identified usability aspects were related to functionality, accessibility, information design, contents, features, subspecialties, and updates. In essence, understanding the interests, motivations, and concerns of end-users (healthcare practitioners in this case study) is vital to the development and implementation of mHealth apps for user empowerment and persuasion, especially in the low- and middle-income healthcare contexts in which healthcare practitioners have limited resources.

DISCUSSION

Designing mHealth apps from a localized usability perspective is critical to ensuring better health education, care, safety, and wellness in resource-constrained southern healthcare settings. Findings also reveal that northern mHealth apps are widely used in underdeveloped, underserved southern countries like Nepal, indicating the need for adopting more defined, targeted, and streamlined design approaches for user empowerment and persuasion. Design approaches developed in the GN for improving usability may not always work well in the southern cultural context. Because a one-size-fits-all approach to designing mHealth technologies for local use is also insufficient (Ohno-Machado, 2015), healthcare tools should be designed through localization, which should take place at the user's site and be a joint endeavor between users and developers (Rose et al., 2017).

My findings also support Welhausen and Bivens' (2021) findings that functional usability considerations remain crucial for users. Also mentioned were specific problems participants encountered when performing or attempting to accomplish certain tasks. Although some participants were concerned about the app's functionality, others cited issues related to accessibility, insufficient content, missing features, and updates. These findings emphasize the importance of better understanding users' localized usability experiences, implying that northern designers should collaborate with southern users as co-designers to respond to the contingencies of locally situated southern cultural contexts.

Although numerous possibilities for persuasion can be considered while designing mHealth apps for southern healthcare practitioners, northern designers can consider applying Fogg's (2003) design principles

as important contributors to localized usability for user empowerment and persuasion. (Table 2 provides an example of how persuasive design concepts can be applied to the development of mHealth apps for localized usability in resource-constrained, underdeveloped countries.)

Table 2. Application of persuasive design principles in mHealth apps for countries in the GS

User and Environment Challenge	Persuasive Design Principles	Design Solution for Localized Usability in the GS Context
Training/knowledge gaps	Reduction	• Break information into a few steps • Eliminate repetitive steps (e.g., need to login repeatedly) • Reduce tabs (steps) to improve navigation • Summarize main findings in a "catchy way"
Knowledge gaps among target users	Tailoring	• Provide images, pictures, videos in addition to text • Include details per practitioners' specialties • Simplify information and incorporate topics in subspecialties • Prioritize information based on the specific needs of each country • Tailor sections that are frequently used based on users' need
Poor internet connectivity in the user's environment	Tailoring	• Develop native or stand-alone apps • Make contents accessible to review and/or download when offline
Training/knowledge gaps	Tunneling	• Present information as sequencing tasks based on importance and help users choose the next steps • Create a simple process for the user by providing self-determination in the information in advance • Highlight differences as needed between fields and indicate them via distinct steps to navigate

The first column (Table 2) describes the operating environment for such apps in the target culture. Healthcare practitioners in the GS are concerned about knowledge gaps regarding recent trials and videos on new medical procedures. To fill these gaps, practitioners can include multimedia content, with voice instructions, still images, and the latest videos to complement the text content. Many healthcare practitioners in low- and middle-income countries with low-bandwidth internet infrastructure may face additional challenges when using mHealth apps, such as poor internet connectivity. The design solution is to develop native apps using the programming languages of the mobile device or its operating system, allowing the apps to run independently (Budiu, 2016).

Northern designers should acknowledge how such tools can increase users' abilities or make things easier to perform within the culturally localized southern context. Practitioners can ask key questions to get insight into designing usable, empowering, and persuasive health-related tools from a localized GS perspective:

- Is the tool inclusive and accessible to users, including healthcare practitioners, regardless of their social standing in the target culture where it is used?
- Does the tool enable healthcare practitioners to accomplish their desired goals or objectives with all possibilities in a complex healthcare setting in the GS?
- Is the tool readily comprehensible, usable, and persuasive within the culturally situated local healthcare system in the GS?
- Does it support healthcare practitioners' localized knowledge systems or existing practices in the target culture?

Answering such questions with "no" suggests that the tool as a persuasive technology can be ethically questionable and perhaps objectionable. The resulting answers can guide TC practitioners if, how, and

what kind of supporting skills, knowledge, and practices are needed to incorporate into the design of healthcare tools for multicultural and multilingual users. Practitioners can also use the answers to address localized usability barriers and make users' tasks less overwhelming within the GS's complex healthcare systems.

IMPLICATIONS FOR PRACTICE AND RESEARCH

mHealth apps, including the Medscape app, are the most popular medical sources among healthcare practitioners worldwide (Rebedew, 2018). As my findings suggest, healthcare practitioners in the GS use mHealth apps designed in the GN to obtain evidence-based medical and health information, current medical breakthroughs, and detailed information about topics related to health and medicine. In non-Western contexts, healthcare practitioners' top app choices, as my findings reveal, are native apps and those that provide detailed and up-to-date information. Thus, technical communicators should focus on functionality, practicality, and details when developing persuasive medical and care-related tools for healthcare practitioners in the GS.

As TC spreads globally, understanding another culture's localized usability expectations requires practitioners to gather data directly by interviewing members of the target culture or conducting focus groups with members of that culture. However, practitioners should be aware that many usability-enhancing "data collection methods developed in the West (such as in-depth interviews, surveys, focus groups, and think-aloud protocols) do not always work well in non-Western cultures" (Baxter et al., 2015). Engaging multicultural healthcare practitioners as co-designers by embracing and developing effective localized user research methods before and during development and UX evaluation of medical and care-related tools can foreground the intentionality of localized design for culturally diverse healthcare practitioners in the increasingly globalized world. To this end, adopting Sun's (2020) CLUE^2 approach and Fogg's (2003) persuasive design principles, rather than ad hoc methods, can equip practitioners in the GN with a systematic conceptual basis and framework with which to create such tools, including mHealth apps, to engage cultural differences in this global village.

Given the need for addressing medical and health-related activities and practices in different cultural contexts, TC scholars have called for culturally sensitive materials for the targeted user community in the international context (e.g., Hall et al., 2004; St.Amant, 2015). However, questions concerning localized usability for user empowerment and the application of persuasive design principles in mHealth apps for promoting self-efficacy in southern healthcare settings are not well addressed in our field. Conducting more research can, in Sauer's (2018) words, "offer our field more and better prospects for future prosperity" (p. 370). Building a more equitable and inclusive future starts with understanding users' needs and expectations, including those of disadvantaged and underrepresented healthcare professional groups from other cultures. So, medical and health research in TC as a field should be directed toward supporting these groups by engaging cultural differences globally. In short, as TC goes global, localized usability research across low- and middle-income healthcare contexts is needed for accomplishing our long-standing commitment to social justice and equity.

LIMITATIONS

As with other research projects, this study has limitations and strengths. The results were based on participants' self-reported data in one small country in the GS, thus liable for bias in terms of generalizing the results in other heterogeneous contexts across cultures. The survey was limited to a few open-ended questions, so asking more questions would allow participants to reflect on their experiences with the app. Also, further qualitative data could be obtained by interviewing or conducting focus groups, or through ethnographic methods such as contextual observations.

In terms of numbers of apps, users, and investments, the US occupies a very large share of the global mHealth market ("Global mHealth Industry," 2020). So, a cross-cultural study on the localized usability of the case app between high-income and low-income settings could help designers better understand and address user needs and expectations in the development and UX evaluation of such tools for Western and non-Western multicultural healthcare practitioners in the global context.

CONCLUSION

This study emphasizes the importance and value of localized usability implementation in health-related tools, such as mHealth apps, for user empowerment in the GS. mHealth apps that apply persuasive design principles can achieve a predetermined objective or outcome. As the TC field expands globally, practitioners need to better understand what it means to design persuasive care-related tools for users in non-Western countries, especially those with poor healthcare systems. I call upon TC practitioners in the Global North to empower users in the Global South by addressing users' localized usability expectations and needs so that the North-South divide can be reduced.

NOTES

1. Though what distinguishes a care-related mobile app as a "health app" or a "medical app" is unclear, they can be distinguished by purpose: for reference and information gathering, medical education and training, and wellness and fitness as well as to offer diagnostics and therapeutic assistance (Albrecht et al., 2014). Applications that are designed to diagnose, treat, alleviate, or prevent disease, or that impact the structure or function of the body may be classified as medical apps and subject to FDA regulation (Roth, 2014). Such apps are designed with medical purposes in mind, whereas health apps generally address individuals who are interested in obtaining health-related information for managing health and wellness, including medical education and training, and those who do not turn mobile devices into regulated medical devices or generate patient-specific data (Roth, 2014).
2. The GN and GS replace classic descriptors such as "first world versus third world" or "more developed versus less developed" nations in discussing socio-economic differences between those countries that have greater wealth and influence, and those that have less. Countries in the GS have generally less rate of human development, whereas those in the GN have a high index rating (Odeh, 2010). These terms are, however, not geographically absolute because some countries in the southern hemisphere are highly developed and wealthy and some in the north are not (Longo, 2014). Scholars engaged in research in the GS prefer the term "Global North and South," which consciously elides other distinctions that perpetuate the primacy of certain nation-states. For the purposes of this study, I refer to highly developed Western countries as GN and underserved, under-resourced non-Western countries as GS.
3. Some participants' survey responses were lightly proofed or edited for clarity.

ACKNOWLEDGEMENTS

The author would like to thank Dr. Biraj Pokhrel, Dr. Sushil Khanal, Sadikshya Upadhayay, and Hem Raj Neupane for their generous support throughout this study. The author would also like to thank Karla Saari Kitalong for her valuable advice and suggestions. Additional thanks to the journal editor, the special issue editors, and reviewers for their insightful comments and feedback to improve the manuscript.

ABOUT THE AUTHOR

Dr. Keshab Raj Acharya is a faculty member in the Department of Engineering Education at the University at Buffalo—SUNY, where he teaches courses related to technical and professional communication. He is available at keshab.acharya@gmail.com.

REFERENCES

Acharya, K. R. (2018). Usability for user empowerment: Promoting social justice and human rights through localized UX design. *Proceedings of the 36th ACM International Conference on the Design of Communication*. ACM. https://doi.org/10.1145/3233756.3233960

Acharya, K. R. (2019). Usability for social justice: Exploring the implementation of localization usability in Global North technology in the context of a Global South's country. *Journal of Technical Writing and Communication, 49*(1), 6–32. https://doi.org/10.1177/0047281617735842

Adepoju, I. O., Albersen, B. J. A., De Brouwere, V., van Roosmalen, J., & Zweekhorst, M. (2017). mHealth for clinical decision-making in sub-Saharan Africa: A scoping review. *JMIR mHealth and uHealth*, *5*(3). http://mhealth.jmir.org/2017/3/e38

Al Ayubi, S. U., Parmanto, B., Branch, R., & Ding, D. (2014). A persuasive and social mHealth application for physical activity: A usability and feasibility study. *JMIR mHealth and uHealth*, *2*(2). https://doi.org/10.2196/mhealth.2902

Al-Ramahi, M., El-Gayar, O., & Liu, J. (2016). Discovering design principles for persuasive systems: A grounded theory and text mining approach. *Proceedings of 2016 49th Hawaii International Conference on System Sciences* (*HICSS*) (pp. 3074–3083). IEEE. https://doi.org/10.1109/HICSS.2016.387

Albrecht, U. V., Pramann, O., & von Jan, U. (2014) Synopsis for health apps: Transparency for trust and decision making. In M. Househ, E. Borycki, & A. Kushniruk (Eds.), *Social media and mobile technologies for healthcare* (pp. 94–108): IGI Global.

Alsswey, A. H., Al-Samarraie, H., El-Qirem, F. A., Alzahrani, A. I., & Alfarraj, O. (2020). Culture in the design of mHealth UI: An effort to increase acceptance among culturally specific groups. *The Electronic Library*, *38*(2), 257–272. https://doi.org/10.1108/EL-04-2019-0097

Andrews, C., Burleson, D., Dunks, K., Elmore, K., Lambert, C. S., Oppegaard, B., Pohland, E. E., Saad, D., Scharer, J. S., Wery, R. L., Wesley, M., & Zobel, G. (2012). A new method in user-centered design: Collaborative prototype design process (CPDP). *Journal of Technical Writing and Communication, 42*(2), 123–142. https://doi.org/10.2190/TW.42.2.c

Apple Store Preview. (2021). Medscape. What's new. Version history. Retrieved Jan. 31, 2022, from https://apps.apple.com/us/app/medscape/id321367289

Arduser, L. (2018). Impatient patients: A DIY usability approach in diabetes wearable technologies. *Communication Design Quarterly, 5*(4), 31–39. https://doi.org/10.1145/3188387.3188390

Armstrong, D., Gosling, A., Weinman, J., & Marteau, T. (1997). The place of inter-rater reliability in qualitative research: An empirical study. *Sociology*, *31*(3), 597–606. https://doi.org/10.1177/0038038597031003015

Batova, T. (2010). Writing for the participants of international clinical trials: Law, ethics, and culture. *Technical Communication*, *57*(3), 266–281.

Batova, T., & Clark, D. (2015). The complexities of globalized content management. *Journal of Business and Technical Communication*, *29*(2), 221–235. https://doi.org/10.1177/1050651914562472

Baxter, K., Courage, C., & Caine, K. (2015). *Understanding your users: A practical guide to user research methods* (2nd ed.). Morgan Kaufmann.

Bhatta, R., Aryal, K., & Ellingsen, G. (2015). Opportunities and challenges of a rural-telemedicine program in Nepal. *Journal of Nepal Health Research Council*, *13*(30), 149–153. https://doi.org/10.33314/jnhrc.v0i0.640

Boettger, R. K., & Palmer, L. A. (2010). Quantitative content analysis: Its use in technical communication. *IEEE Transactions on Professional Communication, 53*(4), 346–357. https://doi.org/10.1109/TPC.2010.2077450

Budiu, R. (2016). Mobile: Native apps, web apps, and hybrid apps. Retrieved from http://www.nngroup.com/articles/mobile-native-apps/

Cardinal, A., Gonzales, L., & Rose, E. (2020). Language and participation: Multilingual user experience design. *Proceedings of the 38th ACM International Conference on Design of Communication.* ACM. https://doi.org/10.1145/3380851.3416763

Chaudhary, R., Rabin, B., & Masum, P. (2019). Attitudes about the use of smartphones in medical education and practice in emergency department of tertiary care hospital. *Journal of Health & Medical Informatics*, *10*(5), 1–6.

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Sage.

Dijkstra, J. J., Liebrand, W. B. G., & Timminga, E. (1998). Persuasiveness of expert systems. *Behaviour and Information Technology*, *17*(3), 155–163. https://doi.org/10.1080/014492998119526

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. John Wiley & Sons.

Dombrowski, L. (2017). Socially just design and engendering social change. *Interactions, 24*(4), 63–65. https://doi.org/10.1145/3085560

Ehn, P. (1992). Scandinavian design: On participation and skill. In P. S. Adler & T. A. Winograd (Eds.), *Usability: Turning technologies into tools* (pp. 96–132). Oxford University Press.

Esselink, B. (2000). *A practical guide to localization*. Benjamins.

Fink, A. (2017). *How to conduct surveys: A step-by-step guide* (6th ed.). Sage.

Fiordelli, M., Diviani, N., & Schulz, P. J. (2013). Mapping mHealth research: A decade of evolution. *Journal of Medical Internet Research*, *15*(5). https://doi.org/10.2196/jmir.2430

Flick, U. (2018). *An introduction to qualitative research* (6th ed.). Sage.

Fogg, B. J. (2003). *Persuasive technology: Using computers to change what we think and do.* Morgan Kaufmann.

Fogg, B. J., Cuellar, G., & Danielson, D. (2009). Motivating, influencing, and persuading users: An introduction to captology. In A. Sear & J. A. Jacko (Eds.), *The human-computer interaction handbook* (pp. 109–172). CRC Press.

Gagnon, M. P., Ngangue, P., Payne-Gagnon, J., & Desmartis, M. (2016). m-Health adoption by healthcare professionals: A systematic review. *Journal of American Medical Information Association, 23*, 212–220. https://doi.org/10.1093/jamia/ocv052

Global mHealth Industry Landscape Overview 2020. (2020, November). Retrieved from https://www.biginnovationcentre.com/publications/page/3

Gonzales, L., & Zantjer, R. (2015). Translation as a user-localization practice. *Technical Communication*, *62*(4), 271–284.

Google Play. (2022). Medscape. Retrieved Jan. 31, 2022, from https://play.google.com/store/apps/details?id=com.medscape.android

Granello, D. H., & Wheaton, J. E. (2004). Online data collection: Strategies for research. *Journal of Counseling & Development*, *82*(4), 387–393. https://doi.org/10.1002/j.1556-6678.2004.tb00325.x

Gu, B., & Yu, M. (2016). East meets west on flat design: Convergence and divergence in Chinese and American user interface design. *Technical Communication, 63*(3), 231–247.

Hall, M., De Jong, M., & Steehouder, M. (2004). Cultural differences and usability evaluation: Individualistic and collectivistic participants compared. *Technical Communication*, *51*(4), 489–503.

Hitt, A. (2018). Foregrounding accessibility through (inclusive) universal design in professional communication curricula. *Business and Professional Communication Quarterly*, *81*(1), 52–65. https://doi.org/10.1177/2329490617739884

Hoft, N. L. (1995). *International technical communication: How to export information about high technology*. John Wiley & Sons.

Jones, N. N., & Williams, M. F. (2017). The social justice impact of plain language: A critical approach to plain-language analysis. *IEEE Transactions on Professional Communication, 60*(4), 412–429. https://doi.org/10.1109/TPC.2017.2762964

Jones, N. N., Moore, K. R., & Walton, R. (2016). Disrupting the past to disrupt the future: An antenarrative of technical communication. *Technical Communication Quarterly*, *25*(4), 211–229. https://doi.org/10.1080/10572252.2016.1224655

Kennedy, K. (2018). Designing for human-machine collaboration: Smart hearing aids as wearable technologies. *Communication Design Quarterly*, *5*(4), 40–51. https://doi.org/10.1145/3188387.3188391

Kirkscey, R. (2020). mHealth apps for older adults: A method for development and user experience design evaluation. *Journal of Technical Writing and Communication*, *51*(2), 199–217. https://doi.org/10.1177/0047281620907939

Ladner, R. E. (2015). Design for user empowerment. *Interactions*, *22*(2), 24–29. https://doi.org/10.1145/2723869

Lauer, C., & Brumberger, E. (2016). Technical communication as user experience in a broadening industry landscape. *Technical Communication*, *63*(3), 248–264.

Lazakidou, A., & Iliopoulou, D. (2012). Useful applications of computers and smart mobile technologies in the health sector. *Journal of Applied Medical Sciences*, *1*(1), 27–60.

Longo, B. (2014). Using social media for collective knowledge-making: Technical communication between the global north and south. *Technical Communication Quarterly*, *23*(1), 22–34. https://doi.org/10.1080/10572252.2014.850846

Marcus, B., Weigelt, O., Hergert, J., Gurt, J., & Gelléri, P. (2017). The use of snowball sampling for multi-source organizational research: Some cause for concern. *Personnel Psychology*, *70*(3), 635–673. https://doi.org/10.1111/peps.12169

Martin, S., Carrington, N., & Muncie, N. (2017). Promoting user advocacy to shift technical communication identity and value. *Technical Communication*, *64*(4), 328–344.

Ming, L. C., Hameed, M. A., Lee, D. D., Apidi, N. A., Lai, P. S. M., Hadi, M. A., Al-Worafi, Y. M. A., & Khan, T. M. (2016). Use of medical mobile applications among hospital pharmacists in Malaysia. *Therapeutic Innovation & Regulatory Science*, *50*(4), 419–426. https://doi.org/10.1177/2168479015624732

Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in Development of Medical Education*, *14*(3), 1–4. https://doi.org/10.5812/sdme.67670

Odeh, L. E. (2010). A comparative analysis of Global North and Global South economies. *Journal of Sustainable Development in Africa*, *12*(3), 338–348.

Ohno-Machado, L. (2015). Tailoring informatics interventions to patients and healthcare providers. *Journal of the American Medical Informatics Association*, *22*(4), 747. https://doi.org/10.1093/jamia/ocv075

Oinas-Kukkonen, H, & Harjumaa, M. (2018). Persuasive systems design: Key issues, process, and system features. In M. Howlett & I. Mukherjee (Eds.). *Routledge handbook of policy design* (pp. 87–105). Routledge.

Opel, D. (2014). Social justice in technologies of prenatal care: Toward a user centered approach to technical communication in home pregnancy testing. *Proceedings of the 32nd ACM International Conference on The Design of Communication*. ACM. https://doi.org/10.1145/2666216.2666223

Osei, E., & Mashamba-Thompson, T. P. (2021). Mobile health applications for disease screening and treatment support in low-and middle-income countries: A narrative review. *Heliyon*, *7*(3). https://doi.org/10.1016/j.heliyon.2021.e06639

Oswal, S. K. (2019). Breaking the exclusionary boundary between user experience and access: Steps toward making UX inclusive of users with disabilities. *Proceedings of the 37th ACM International Conference on the Design of Communication.* ACM. https://doi.org/10.1145/3328020.3353957

Phillips, A., & Thornbory, G. (2014). Apps for health professionals. *Occupational Health & Wellbeing*, *66*(4), 27.

Pokhrel, P., Karmacharya, R., Taylor Salisbury, T., Carswell, K., Kohrt, B. A., Jordans, M. J. D., Lempp, H., Thornicroft, G., & Luitel, N. P. (2021). Perception of healthcare workers on mobile app-based clinical guideline for the detection and treatment of mental health problems in primary care: A qualitative study in Nepal. *BMC Medical Informatics and Decision Making*, *21*(1), 1–12. https://doi.org/10.1186/s12911-021-01386-0

Rebedew, D. (2018). Six mobile apps to make prescribing easier. *Family Practice Management*, *25*(6), 11–16.

Rose, E. J. (2016). Design as advocacy: Using a human-centered approach to investigate the needs of vulnerable populations. *Journal of Technical Writing and Communication, 46*(4), 427–445. http://dx.doi.org/10.1177/0047281616653494

Rose, E. J., Racadio, R., Wong, K., Nguyen, S., Kim, J., & Zahler, A. (2017). Community-based user experience: Evaluating the usability of health insurance information with immigrant patients. *IEEE Transactions on Professional Communication*, *60*(2), 214–231. https://doi.org/10.1109/TPC.2017.2656698

Roth, V. J. (2014). The mHealth conundrum: Smartphones & mobile apps—how much FDA medical device regulation is required? *North Carolina Journal of Law & Technology*, *15*(3), 359–429.

Roy, D. (2013). Toward experience design: The changing face of technical communication. *Connexions • International Professional Communication Journal*, *1*(1), 111–118.

Saru, E. H., & Wojahn, P. (2020). "Glocalization" of health information: Considering design factors for mobile technologies in Malaysia. *Journal of Technical Writing and Communication, 50*(2), 187–206. https://doi.org/10.1177/0047281620906131

Sauer, G. (2018). Applying usability and user experience within academic contexts: Why progress remains slow. *Technical Communication Quarterly*, *27*(4), 362–371. https://doi.org/10.1080/10572252.2018.1521637

Sezgin, E., Özkan-Yildirim, S., & Yildirim, S. (2017). Investigation of physicians' awareness and use of mHealth apps: A mixed method study. *Health Policy and Technology*, *6*(3), 251–267. https://doi.org/10.1016/j.hlpt.2017.07.007

Shati, A. (2020). mHealth applications developed by the Ministry of Health for public users in KSA: A persuasive systems design evaluation. *Health Informatics International Journal*, *9*(1), 1–13. https://doi.org/10.5121/hiij.2020.101

Spinuzzi, C. (2005). The methodology of participatory design. *Technical Communication*, *52*(2), 163–174.

St.Amant, K. (2015). Introduction to the special issue: Cultural considerations for communication design: Integrating ideas of culture, communication, and context into user experience design. *Communication Design Quarterly, 4*(1), 6–22. https://doi.org/10.1145/2875501.2875502

St.Amant, K. (2017a). The cultural context of care in international communication design: A heuristic for addressing usability in international health and medical communication. *Communication Design Quarterly*, *5*(2), 62–70. https://doi.org/10.1145/3131201.3131207

St.Amant, K. (2017b). Of scripts and prototypes: A two-part approach to user experience design for international contexts. *Technical Communication*, *64*(2), 113–125.

St.Amant, K. (2021). Creating scripts for crisis communication: COVID-19 and beyond. *Journal of Business and Technical Communication*, *35*(1), 126–133. https://doi.org/10.1177/1050651920959191

St. Germaine-McDaniel, N. (2010). Technical communication in the health fields: Executive Order 13166 and its impact on translation and localization. *Technical Communication*, *57*(3), 251–265.

Stake, R. E. (1995). *The art of case study research*. Sage.

Strecher, V. J. (1999). Computer-tailored smoking cessation materials: A review and discussion. *Patient Education & Counseling*, *36*(2), 107–117. https://doi.org/10.1016/S0738-3991(98)00128-1

Sun, H. (2012). *Cross-cultural technology design: Creating culture-sensitive technology for local users*. Oxford University Press.

Sun, H. (2020). *Global social media design: Bridging differences across cultures*. Oxford University Press.

Sun, H., & Getto, G. (Eds.) (2017). Localizing user experience: Strategies, practices, and techniques for culturally sensitive design [Special section]. *Technical Communication, 64*(2), 89–94.

Wallace, S., Clark, M., & White, J. (2012). It's on my iPhone: Attitudes to the use of mobile computing devices in medical education, a mixed-methods study. *BMJ Open*, *2*(4). http://dx.doi.org/10.1136/bmjopen-2012-001099

Walton, R. (2016). Supporting human dignity and human rights: A call to adopt the first principle of human-centered design. *Journal of Technical Writing and Communication*, *46*(4), 402–426. https://doi.org/10.1177/0047281616653496

WebMD LLC. (2022, November). Medscape. Retrieved from https://www.medscape.com/public/medscapeapp

Welhausen, C. A., & Bivens, K. M. (2021). mHealth apps and usability: Using user-generated content to explore users' experiences with a civilian first responder app. *Technical Communication*, *68*(3), 97–112.

Wright, K. B. (2005). Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication*, *10*(3). https://doi.org/10.1111/j.1083-6101.2005.tb00259.x

Zhang, J., Johnson, T. R., Patel, V. L., Paige, D. L., & Kubose, T. (2003). Using usability heuristics to evaluate patient safety of medical devices. *Journal of Biomedical Informatics*, *36*(1–2), 23–30. https://doi.org/10.1016/S1532-0464(03)00060-1

Zhu, P., & St.Amant, K. (2007). Taking traditional Chinese medicine international and online: An examination of the cultural rhetorical factors affecting American perceptions of Chinese-created Web sites. *Technical Communication*, *54*(2), 171–186.

APPENDIX

Sample Survey Questions

1. What are your purposes of using mHealth apps? (Please select all that apply)
   - To improve the performance of healthcare
   - To support patient needs and expectations
   - To find information for effective patient treatment
   - To provide immediate care and health support
   - To make quick decisions during critical care situations
   - To find reliable medical and health information
   - Other (Please specify)
2. How often do you use mHealth apps other than the Medscape app?
   - Always
   - Very often
   - Sometimes
   - Rarely
3. How often do you use the Medscape app?
   - many times a day
   - once a day
   - many times a week
   - once or twice a week
   - once a month
4. How long have you been using the Medscape app?
   - Less than 1 month
   - More than 1 month
5. How easy was it to install and operate the app on your device?
   - Very easy
   - Easy
   - Neither difficult nor easy
   - Difficult
   - Very difficult
6. Why do you want to use the Medscape app? (Please select all that apply)
   - Because the app is free to download
   - Because it is well designed and easy to use
   - Because my colleagues and many other medical professionals use it in my country
   - Because I learned about it from my fellow medical and healthcare practitioners in my workplace
   - Other (please specify)
7. The information in the Medscape app is well organized or designed, so I can easily find and understand what I need.
   - Strongly agree
   - Somewhat agree
   - Neither agree nor disagree
   - Somewhat disagree
   - Strongly disagree
8. Is the Medscape app designed and developed to meet your needs and expectations?
   - Yes, it is designed and developed to meet the needs and expectations of users like myself.
   - Yes, it is designed and developed to meet the needs and expectations of users, but it is always not easy to use the app.
   - No, it is not designed and developed to meet the needs and expectations of users like myself.
9. If not, what should be done so that the app meets your needs and expectations?
10. What do you prefer to use?
    - Medscape app
    - Medscape website
    - Both
11. If you prefer the Medscape website to the app, why?
12. The information provided in the application is very reliable.
    - Strongly agree
    - Somewhat agree
    - Neither agree nor disagree
    - Somewhat disagree
    - Strongly disagree
13. How often the app crashes or causes problems on your devices?
    - Always
    - Very often
    - Sometimes
    - Rarely
    - Never
14. I can use the app even when the internet connection is poor or not available.
    - Strongly agree
    - Somewhat agree
    - Neither agree nor disagree
    - Somewhat disagree
    - Strongly disagree

15. The app has improved my access to healthcare information, medical news, medical education, and consultations with experts.
    - ○ Strongly agree
    - ○ Somewhat agree
    - ○ Neither agree nor disagree
    - ○ Somewhat disagree
    - ○ Strongly disagree
16. How satisfied are you with the app?
    - ○ Extremely satisfied
    - ○ Somewhat satisfied
    - ○ Neither satisfied nor dissatisfied
    - ○ Somewhat dissatisfied
    - ○ Extremely dissatisfied
17. How likely are you to recommend the app to a friend or colleague?
    - ○ Extremely likely
    - ○ Somewhat likely
    - ○ Neither likely nor unlikely
    - ○ Somewhat unlikely
    - ○ Extremely unlikely
18. What confuses or annoys you about the app?
19. What should be done to make the app more usable, accessible, and reliable for users?
20. What other mHealth apps do you use?

Everyone Is Always Aging: Glocalizing Digital Experiences by Considering the Oldest Cohort of Users

doi: https://doi.org/10.55177/tc674376

By Allegra W. Smith

ABSTRACT

Purpose: Older adults (aged 65+) represent an under-explored group in technical communication, despite rapid population aging. Designing for older age cohorts holds potential for "glocalization"—integrating the local and the global—through attending to the needs of a specific user community while benefiting all users through interventions that prioritize usability, accessibility, and generational cultures.

Method: Using structured task analysis methods, I investigated the steps and decisions that six adults aged 75+ took to accomplish five increasingly difficult tasks.

Results: Though participants were easily able to access the Internet and find a news story online, they faced difficulties when attempting to modify the homepage on their browser, use mapping tools to determine the distance between two locations, and identify a government document answering a question about income taxes. These findings point to four key considerations when designing for older age cohorts: user customization and personalization, information literacy, deceptive patterns, and mismatched mental models stemming from gaps between declarative and procedural knowledge. Addressing these needs through targeted design, documentation, and education can help the oldest user group to realize their technological goals.

Conclusion: This very *localized* study of a specific group of users has *global* implications for research and practice. Designing experiences for the oldest adults provides critical opportunities for usability, because though they represent a specific user community, designing for them and alongside them actually benefits all users, because everyone is always aging. Thus, accounting for aging bodies and minds serves as an important form of glocalization for designers of communication.

KEYWORDS: Accessibility, Aging, Older adults, Task analysis, Usability

Practitioner's Takeaway

- Older adults (age 65+) represent an often ignored and underserved population of technology users.
- Although members of the oldest age cohort (age 75+) are typically able to access the Internet and interact with content online, they may face difficulties using mapping tools, searching for credible information, and changing device and browser settings to customize their experience.
- Gaps in information literacy, deceptive patterns built into interfaces, and incomplete mental models all pose threats to older adults' user experiences that can be addressed through technical communication interventions.
- Improving websites and interfaces for older adults benefits all users because everyone is always aging.

Allegra W. Smith

INTRODUCTION

The global population is aging at an unprecedented rate due to twin declining birth and death rates (U.S. Census Bureau International Programs, 2020). Population aging presents unique opportunities and challenges for technical communicators and user experience (UX) designers, as older adults have unique physical, cognitive, material, economic, and sociocultural needs that shape their interactions with interfaces and documentation. Older adults, typically classified as those aged 65 or older, represent as diverse a user group as any; in fact, this group is typically subdivided into age cohorts based on the life changes that older adults experience as they age (Ortman, Velkoff, & Hogan, 2014). The "young old" (age 65–74) have distinctly different experiences with computers and the Internet than the "old" (age 75–84) and the "oldest old" (age 85+), respectively. Although these experiences are often categorized by older adults' physical interactions with technology, shaped by the bodily processes of aging (e.g., low vision necessitating larger type sizes, essential tremors that make manipulating a touchpad difficult), the lives and technology usage of older adults are complex and mediated by a variety of human and nonhuman factors (Czaja et al., 2019).

The complexity of the aging experience creates many questions for technical communicators. How do older adults learn and use technologies differently from their younger counterparts? What experiences should we architect to meet the needs of aging users? How do we "future-proof" technology (Wilkinson & Gandhi, 2015) for current generations and generations to come?

In this article, I review the previous technical communication theory and research focusing on older adults as a distinct group of users. Then, I describe a study using structured task analysis methods with six older adult computer users aged 75+, followed by results and discussion. I conclude by analyzing patterns of user behaviors across the study participants, as well as pervasive problems they faced that could be alleviated through targeted design and documentation interventions. By detailing and interpreting the results of this very localized study of a specific group of users, I draw global implications for communication design practice and user advocacy. Ultimately, I argue that designing for old age serves as a form of *glocalization*, where the concerns of a particular or local group of users can inform practice for technology design and education more broadly.

LITERATURE REVIEW

In 2019, 54.1 million people, or more than one in every seven Americans, were over the age of 65; the percentage of Americans aged 65+ has quadrupled since 1900, and by 2040, there will be twice as many older Americans as there were in 2000 (Administration on Aging, 2021). Though older adults today have reported greater screen time than they did a decade ago (Livingston, 2019), this age cohort still lags greatly behind its younger counterparts in technology adoption (Smith, 2014), with users age 65+ feeling "digitally unprepared" or unconfident in their ability to use electronic devices for necessary activities (Anderson & Perrin, 2017).

Despite the country's shifting age demographics—and, consequently, the shifting demographics of technology users—technical communication research largely does not account for age as a component of identity and a factor that affects technology adoption and use. Technical communication's historic focus on user-centered design (Johnson, 1998; Redish, 2010; Salvo, 2001; Spinuzzi, 2005) and renewed emphasis on social justice and advocacy (Agboka, 2013; Jones, 2016; Rose, 2016; Walton et al., 2019) make addressing the needs of a growing older adult population a seemingly natural fit for designers. However, relatively few articles have been published in the field's flagship journals that focus on age—and old age in particular—as a defining variable or marker of difference. Across the five main journals in technical communication (*Journal of Business and Technical Communication*, *Journal of Technical Writing and Communication*, *Technical Communication*, *Technical Communication Quarterly*, and the *IEEE Transactions on Professional Communication*, respectively), only 12 full-length articles addressing older adults as a user group have been published in the past 30 years. I identified these articles by searching for the terms "older adult," "senior citizen," "middle age," "elderly," and "old age" in each journal's article titles, keywords, and abstracts. After identifying the published pieces that mentioned these terms, I removed those that gave only brief mentions to older adults (e.g., those that merely acknowledged the presence of older users, gave a cursory reference to another work that discussed age

or aging, or mentioned older adults in a way that was not central to the subject of the publication), as well as book reviews or brief summaries of previous research (such as the "Recent and Relevant" section of *Technical Communication*).

Though one 2001 article in the *Journal of Technical Writing and Communication* explored documentation for older age cohorts (van Horen et al., 2001), it used the now outdated term "elderly" to frame older adults as suffering from "age deficiencies." Technical communication scholarship that recognized aging as a process that extends beyond biological functions began in 2004, with Lippincott's article, "Gray Matters: Where are the Technical Communicators in Research and Design for Aging Audiences?" This piece has functioned as both a rallying cry and a manifesto, where Lippincott emphasized the importance of integrating age into technical communication research and outlined four considerations for investigating aging in teaching, research, and practice. These considerations include:

- refining age as a "demographic variable" to understand the nuances and complexities that mark different age cohorts, as well as the other identity categories that mediate the aging experience;
- integrating age with other "variables of audience analysis" through including older adults in experience design;
- building an understanding of multidisciplinary aging research to better address the needs of older adults; and
- collaborating with interdisciplinary and international colleagues to conduct aging research that is inclusive and equitable (Lippincott, 2004, p. 157).

Lippincott's work followed a *Journal of Technical Writing and Communication* article that mapped the challenges faced by older adults in "accumulating technologies and literacies" (Crow, 2002). Notably, Crow provided a case study illustrating how the inequalities of a generational digital divide could be compounded and magnified by classed, raced, and gendered divides. Taken together, Lippincott's and Crow's articles formed the foundation for intersectional inquiry into age in technical communication, but they have not been followed by additional studies examining older adults' technology use *in situ* or case studies examining the interfaces commonly used by members of older age cohorts.

Little work on age or aging has been published in the field since Lippincott's call nearly twenty years ago. The February 2006 issue of *Technical Communication* provided two articles in this area. In a review of a report created for the AARP, usability specialists Chisnell, Redish, and Lee (2006) expounded upon "usability and design issues common to older users" by creating heuristics, personas, and tasks for website review and rating. They offered a four-point heuristic for classifying users (age, ability, aptitude, and attitude), as well as a thorough list of considerations for visual design, interaction design, and information architecture.

In the same issue, Van der Geest (2006) provided recommendations for participant recruitment, communication, and consent in the article "Conducting Usability Studies with Users Who Are Elderly or Have Disabilities." However, Van der Geest's juxtaposition of these two populations—like that of many human-computer interaction studies on older adults—conflated age with disability and framed older adult populations according to a deficit model. Although it is certainly important to consider the impacts that aging bodies have on technology use, declining motor and cognitive abilities are not the only factors that affect usage for older age cohorts. What's more, if we reduce older users to their impairments, we risk stereotyping them in ways that curtail design possibilities, as well as these users' full participation in digital life.

Van der Geest's colleagues from Twente University in The Netherlands—Loorbach, Karreman, and Steehouder (2007, 2009, 2013a, 2013b)—published four of the 12 available articles on older adults, typically using the term "seniors" to refer to their target user group. Their body of work has sought to build confidence, motivation, and usability for 60- to-70-year-old users when when interacting with instruction manuals. Schwender and Köhler's (2006) article "Introducing Seniors to New Media Technology" similarly focused on documentation for cell phones, concluding that "further data is needed to gain an accurate picture of the senior" (p. 464).

O'Hara's (2004) *Technical Communication Quarterly* article "Curb Cuts on the Information Highway" described "communication impairments" experienced by older users, before detailing accessibility initiatives aimed at closing the "digital divide" and concluding with analyses of three websites designed specifically for older populations: seniornet.org, aarp.org, and

seniors-site.com. O'Hara's article is noteworthy in that it is the only one in this sample that described cultural influences that affect internet use by older adults; she identified ageism and "technophobia" (or luddism) as two key factors for communicators and marketers to consider. Previous technical communication literature on aging and older adults is limited in scope and application. The majority of the aforementioned articles were written more than 10 years ago, before the advent of Web 2.0; thus, they do not account for newer technologies like smartphones, social media, and virtual assistants, which have greatly impacted digital landscapes and cultures. Besides Loorbach, Karreman, and Steehouder (2013a, 2013b), the only publication in a mainline journal that focused on older adults in the second decade of the 21st century is Cleary and Flammia's (2012) article, "Preparing Technical Communication Students to Function as User Advocates in a Self-Service Society." Identifying older adults as one of "the three user groups most at risk for being left behind in the digital age" (p. 306), along with disabled persons and non-native speakers of English, Cleary and Flammia reviewed the literature on web usability for older adults from the previous decade and outlined tactics for exposing technical communication students to testing methods, design ethics, and cultural differences. Again, this piece offered an overview of previous research from fields adjacent to technical communication and called for advocacy for older adults but did not add new data or user stories to give contours and context to the best practices it provides.

Technical communicators have yet to fully investigate the user experiences of older adults or conduct studies localized to specific older adult communities, despite the opportunities that such communities pose to understand technology usage in context. Retirement or senior living communities remain apparently untouched by researchers as a resource for understanding the user behaviors of older populations.

WHAT DOES IT MEAN TO (G)LOCALIZE FOR AGE?

Older adults provide designers a unique opportunity for localized usability, given the complex facet of identity that sets them apart from other user populations: age. When we design for old age specifically, we advance usability in a way that focuses attention on a *local* population whose characteristics have *global* implications. Because all users are always aging—and the experience of aging is near-universal, though some may age quicker than others, due to a constellation of biological, economical, sociocultural, and regional factors—any intervention for technical communication or user experience design for older adults in fact benefits all users. This makes designing for old age a practice not just of localization, but of *glocalization*.

Glocalization refers to the blurring of boundaries between the global and the local that necessitates a cultural balance between the universal and the particular (Ritzer, 2003; Robertson, 1994). Inherent in glocalization is a recognition of power and agency, as Roudometof (2016) explained: recognizing that local communities or cultures exert power on a global stage, just as global forces exert power on them. A glocal framework provides the opportunity to name, theorize, measure, and work within these flows of agency. Such a merging of "globalization" and "localization" represents another under-explored concept in technical communication theory and practice (Breuch, 2015). The practice of glocalizing involves centering local conditions and knowledge that can be lost when considering the role of technology and communication on a global level, which can provide opportunities to investigate the interplay between these differing levels while balancing them during the design process (Sun, 2012, pp. 245–246).

Though glocalization has been occasionally cited in technical communication research as a tactic for adapting content for regional or national cultures, the notion of the glocal holds potential for extending beyond these geographic distinctions and into other cultures—such as the cultures of generations. Each generation holds its own cultural norms that impact technology use, and at any given moment of time, a generational cohort also is marked by certain physical and cognitive features of age. For example, though the Silent Generation, at 75–95 years old, currently has the lowest rate of smartphone adoption of any age cohort and may have trouble reading on a smartphone screen because of presbyopia (difficulty seeing up close); Generation Z, at 10–25 years old, may prefer smartphones over desktop devices and generally see well with minimal use of corrective lenses. Of course, eyesight is but one factor affecting adoption and use of

smartphones across generations, and a study of older adults' smartphone use would need to investigate other physical and attitudinal elements, but the findings of such a study could later be applied to interventions that would not only enable older adults to use technology, but also facilitate the continued use of technology for younger adults as they age over time. Designing for old age, then, can be a form of glocalization, given its capacity for integrating particular or *local* user experiences (e.g., the digital goals and tasks of 70- and 80-somethings) with more universal or *global* concerns (e.g., how to create technology that addresses the needs of a broad range of age cohorts, how to guide users with a variety of experience levels when using a new product or interface, etc.).

This type of glocalization for age is different from existing theories like universal design, which seeks to comprehensively address disability to create better experiences for all users (Walters, 2010), in that it expands beyond disability in its treatment of older adults as a user group. Though states of bodily and cognitive decline are often foregrounded when considering older age cohorts, they do not represent the totality of the lives of older adults, nor are they the sole elements shaping these age cohorts' user experiences. The experience of aging with technology is shaped by physical, psychological, social, economic, and experiential aspects (Wilkinson & Gandhi, 2015), all of which should be considered when designing devices and interfaces for older adults. Thus, the findings and implications of this study provide one example of the types of information that could be used to glocalize for age, advocating for the needs of older adults and designing technologies that facilitate easy adoption and usage for users of all ages.

METHOD

This IRB-approved study took place in an independent living apartment facility located in a large retirement community in the southern United States. This particular facility was chosen because it housed members of older age cohorts (i.e., individuals aged 75–85 and 85+) who could still live independently, and thus could understand the risks inherent in user research and provide informed consent. I recruited six residents (a number that corresponds with the accepted sample size for usability test studies—see Barnum, 2002; Nielsen, 2012a) aged 78–91 to participate in the research, with the help of the apartment complex's manager and a resident liaison who occasionally assisted with technical support in the community. These community experts helped gather a sample of participants who represented a mix of ages, genders, and comfort levels with technology, whom I observed interacting with their computers and other devices in their apartments.

The research involved two phases: in the first, a naturalistic observation, participants demonstrated their typical daily computer use; and in the second, a structured task analysis, participants completed a series of increasingly difficult tasks with their computer and used "think aloud" protocol (Cooke, 2010; Nielsen, 2012b) to explain their processes. This article details the results of the structured task analysis and provides key implications for technical communicators and user experience professionals.

Task analysis methods date to the early 1980s, when the increased mechanization of industry and the military necessitated improvements in human-machine interaction (Militello & Hoffman, 2008). At the heart of task analysis is watching users as they work. Task analyses, as with most user research work, involve field studies or site visits with people who use a product or a service. The key to task analysis is learning about users by viewing them in action, to better understand how "any and all parts of a product—software, hardware, interface, documentation. . . help[s] people do things" (Hackos & Redish, 1998, p. 52). Many different kinds and levels of task analysis exist, including procedural analysis, which involves examining the steps that users take or the decisions that they make to accomplish a task (Hackos & Redish, 1998). This project involved procedural analysis because of the nature of the research question and the goals of data collection: to better understand the oldest age cohort's familiarity with certain digital activities, their thought process and mental models when attempting to accomplish certain objectives online, and the steps that they took when they encountered problems with their technology. As such, the six participants were asked to complete the following five tasks:

1. Access the Internet on your computer.
2. Set up a new homepage for your internet browser.
3. Find a news story of interest to you about world events.

4. Determine the distance between your home and the nearest Kohl's store.
5. Find a government document that answers the question, "how do I deduct medical expenses for transportation to and from doctor's appointments on my taxes?"

I did not assist the participants in completing the tasks, but instead asked guiding questions and reminded them to explain to me how they felt, and how they would go about solving the issue if they were posed with a similar problem in real life. This followed a "think aloud" protocol approach, where the participants were encouraged to verbalize their reactions or emotions throughout the procedure (Cooke, 2010; Nielsen, 2012b). This session identified "pain points" (troublesome problems) for members of this population attempting to complete tasks using computers and the Internet and generated rich qualitative feedback from participants while doing so.

Observations with each participant were video recorded, and a short exit interview was conducted to debrief participants and answer their questions about the experience. The video recordings were later transcribed, and participants were assigned pseudonyms to protect their anonymity. Because the participants lived independently (i.e., they did not live in an assisted living or nursing facility), they were not considered a vulnerable population by university IRB. To protect their personal data, I explained to participants before the observations that their computer screens would be recorded and advised them to neither view nor input sensitive data (e.g., financial or medical information, passwords) during the sessions; if they did reveal any personally identifiable or sensitive data, I notified and warned them, typically moving the camera away from the device so the information did not appear on the recording. Only the participants' screens were recorded; I did not record their keystrokes (to prevent the recording of passwords) or their faces (to protect their identities).

RESULTS

In Table 1, I provide a brief sketch of each participant in this study. In addition to the participants' pseudonyms and demographic information, I also list their typical online activities, as demonstrated in the ethnographic observations conducted with them prior to the structured task analyses. As shown in Table 1, participants used similar technology and completed similar online tasks, such as emailing others, accessing medical information, and reading news, to name a few.

Table 1. Participant demographics

Pseudonym	Gender	Age	Task analysis time	Devices used	Typical online activities
Daisy	Female	82	14:12	PC laptop	banking and financial planning; email (Gmail); news and current events; medical information; search (Google); shopping (Amazon)
Mabel	Female	91	17:57	PC desktop	email (Outlook Mail); printing; security (virus scanning); search (Google); shopping (Amazon); social networking (Facebook)
Walter	Male	82	17:47	PC desktop	ancestry and genealogy; email (AOL Mail); mailing lists and groups; medical information; search (Google); social networking (Facebook); sorting and navigating files; travel booking/planning; troubleshooting; word processing and correspondence
David	Male	90	31:16	Chrome desktop, Jitterbug smartphone	banking and investing; email; images; news; reference (dictionary, encyclopedia, etc.); religion and spirituality (Bible lookup, spiritual commentary, etc.); search; smartphone apps; sports; text messaging; virtual assistant; voice-to-text

Everyone Is Always Aging

Table 1. Participant demographics

Pseudonym	Gender	Age	Task analysis time	Devices used	Typical online activities
Agatha	Female	86	18:07	PC desktop, Nook eReader	calendar and scheduling; design programs; email (AOL Mail); e-reading and books; hobbies and leisure; social networking (Facebook); photo editing; printing; search (Bing); shopping; sorting and navigating files; travel booking/planning; video chatting (Skype); word processing and correspondence
Susan	Female	78	22:44	PC laptop, Kindle eReader, Amazon Echo speaker and Alexa virtual assistant, iPhone	apps; banking and investing; calendar and scheduling; cloud and information backup (Carbonite); email (AOL Mail); e-reading and books; hobbies and leisure; maps and navigation; music (Apple iTunes); news and current events; search (AOL and Google); security (LastPass password keeper); shopping (Amazon); virtual assistant
TOTAL			2:02:03		

Table 2. Task analysis performance summary

Name	T1	Time	T2	Time	T3	Time	T4	Time	T5	Time	Total time
Daisy	✓	0:26	X	0:02	✓	1:08	X	3:17	X	4:04	14:12
Mabel	✓	0:38	X	0:07	✓	3:18	X	0:22	X	2:45	17:57
Walter	✓	0:15	X	0:12	✓	1:44	X	2:44	~	2:41	17:47
David	✓	0:05	X	0:23	✓	1:09	✓	5:54	✓	8:02	31:16
Agatha	✓	0:11	X	0:05	✓	1:11	✓	8:43	✓	7:47	18:07
Susan	✓	0:23	~	3:30	✓	1:48	✓	2:34	✓	4:23	22:44

✓ Indicates that participant successfully completed the task
X Indicates that participant was unable to complete the task
~ Indicates that participant did not complete the task but likely would have been able to with additional time or resources that were not available at the time of data collection

A summary of the participants' experiences in the structured task analysis, including the time spent on each task and whether they were successful in accomplishing the goal of the task, is presented in Table 2.

As Table 2 indicates, each participant was successful at accessing the Internet on their computer and finding a news story of interest to them (Tasks 1 and 3), though they had mixed experiences with using online mapping tools and finding government sources that answered tax questions (Tasks 4 and 5). Nearly all participants could not or would not change the homepage on their internet browser (Task 2). The following sections describe the task performance results in greater detail.

Task Performance Successes

All six participants were easily able to turn on their computers and access the Internet (Task 1), and each indicated that they did so every day or nearly every day. Indeed, 73% of Americans over age 60 self-identify as internet users (Livingston, 2019). However, browser preferences varied across the group: 82-year-old Daisy used Mozilla Firefox, 91-year-old Mabel and 82-year-old Walter used Internet Explorer (which had been

replaced by Microsoft Edge as the default Windows browser three years prior), 86-year-old Agatha and 90-year-old David used Google Chrome, and 78-year-old Susan began her session on AOL Desktop Gold before navigating to Google Chrome to work on later tasks. None of the participants articulated a particular preference or brand loyalty to the browser that they used, and most simply continued to use the browser that was either installed as default on their machine or set up by their more technologically savvy children or grandchildren.

Task 3, which focused on finding a news story online, appeared similarly easy for the participants, though each demonstrated different methods for finding and accessing news, as well as different user journeys after completing the task's stated objective. Based on my previous experiences with this population, I expected that participants would open their browsers to an internet search provider landing page (e.g., aol.com, my.xfinity.com, currently.att.yahoo.com, etc.) which they would then scan for an article of interest. Agatha and Susan both took this approach, watching the carousel on aol.com and scrolling through the headlines until finding a topic that caught their eye.

However, other participants did not have news content featured on their browser homepage or did not have a homepage set on their browser at all (see next section for the results of Task 2, which expands on this). Daisy typed a query for a specific topic of interest to her into a search bar, which led her to a series of Google search results. She clicked the first result, which linked to a December 2017 article from *The Guardian*. Walter took a similar approach to seek out information on a specific topic, but, instead of typing a query into a search engine, he navigated to his AOL homepage and clicked for a link to a story to seek out preliminary information before typing keywords about the topic into the search bar at the top of the page to get more details. He finished his journey by looking at a Wikipedia page on the topic, explaining that he preferred this source over traditional news networks (e.g., NBC, Fox, CNN) because he already had access to that content on television.

On the flip side, Mabel preferred more traditional media and did not appear to have much experience with online news content. She pondered the task for a few moments, before typing "daily news" into the Google Search bar and selecting a result that took her to the website of a regional newspaper. David similarly typed "world news" into his Google search bar and selected NBC News from the results.

Task Performance Breakdowns

Participants had the greatest difficulty with the task that asked them to change the homepage on their internet browser (Task 2). Some of this difficulty stemmed from terminology—multiple participants confessed to not knowing what a homepage and/or browser was. Others simply opted to skip the task because they thought that the process of changing their homepage would be too difficult or time-consuming. The only participant to attempt this task was 78-year-old Susan, who indicated that she did not know how to change her homepage on AOL, her preferred browser, but she could probably do it on Google Chrome instead. After accessing Chrome, she searched for information on how to change her homepage and found instructions for changing homepages on Microsoft Edge. Though she did not end up changing her homepage on any browser during the task analysis session, she indicated that she was confident she would be able to find an answer to the question if given enough time.

Though no participants were able to complete Task 2, the results for Tasks 4 and 5 were mixed, with half of the participants succeeding in each. Task 4, requiring the use of web mapping tools to determine the distance between the participants' homes and the nearest Kohl's store, stumped the oldest participant, Mabel, from the beginning; she admitted that she had "never done it" and had no idea how to use a computer to calculate distance or find directions. Walter and Daisy both tried to use Google to find information on how to get to Kohl's but encountered a potentially harmful mapping website that attempted to install malware on their PCs. (I warned them before they could click to download any plugins or files from the site and advised them to run a scan on their antivirus software after the session concluded, just to be safe.)

Of the three participants who succeeded in the task, each took a different route. Agatha wrote down the instructions for the task on a piece of paper next to her desk to guide her as she searched for directions on Bing Maps. Susan recognized that there were multiple methods for finding the distance between two points using technology, first asking her Amazon Echo smart speaker before navigating to MapQuest

on her computer. Like Mabel, David had not used a computer to calculate the distance between two points before, but resolved to complete the task by typing a query into Google: “How would I use the computer to find the distance from [retirement community name] to Kohl’s department store?” This eventually led him to Kohl’s website, where he entered his zip code to find the nearest store, which the site estimated was approximately 3.6 miles away.

The fifth and final task posed greater difficulties for the participants because of its complex nature (finding a document to answer a specific tax question about medical deductions that came from a government source) and their lack of previous experience seeking information of this nature online. Though Susan combed TurboTax for a link to a government document with the guidelines for itemizing deductions, Agatha and David both tried multiple search strings (i.e., “how do I deduct medi [*sic*],” “what form would I use to calculate mileage for tax completion, “IRS medical expenses,” “how do I deduct medical mileage”) before eventually finding the United States’ IRS official publication on the deduction of medical and dental expenses, Topic 502.

Walter, who would typically call his tax consultant to answer questions about deductions and credits, searched for TurboTax and immediately clicked the live chat “ask a question now” option on the homepage for the tax preparation service. He indicated that he would type in his question and hit “start chat” to ask a representative for an answer. Although not a government document, this would have likely resulted in him finding an accurate answer to the question being asked in the task. Walter’s willingness to text with a representative (instead of insisting on speaking with a person over the phone) is also noteworthy here, as the older adult participants in this study typically expressed strong preferences for speaking on the phone, rather than corresponding through instant message. Daisy and Mabel failed to complete the fifth task because of difficulty identifying legitimate government sources, as well as opaque or outright deceptive information design of websites and apps, also known as “deceptive patterns” (Brignull, 2022) that misled them into clicking on useless—or worse, dangerous—links. The third subsection of the discussion of the study results provides an explanation of these patterns.

DISCUSSION

These older adults’ experiences completing online search, mapping, and device customization tasks reveal key themes and implications for documentation, education, technology design, and culture. The following sections outline considerations for technical communication researchers and designers seeking to advocate for older adult users and localize experiences with these age cohorts in mind.

Customization and Personalization

Participants not completing Task 2 successfully is not necessarily due to a lack of knowledge but rather a lack of inclination to modify the default settings on one’s computer. Some participants lacked appropriate vocabulary to name a browser homepage or explain what one is, but with explanation, they could understand the concepts. For example, other than Susan, all participants indicated little desire to change their browser homepage and indicated that they were either satisfied with their landing page experience or had not at all considered the possibility of changing it.

Though the potential benefits of customization of technology for older adults are well documented in the biomedical and healthcare domain (Freund et al., 2017; Kappen et al., 2020; Mannheim et al., 2019), the preferences of the participants of the present study seem to indicate that members of the oldest age cohort feel hesitant to modify the basic settings of their devices. This result may stem from a fear of using the device “incorrectly” or breaking it—a fear that was prevalent across the participant pool and stemmed both from previous negative experiences with technology and ageist assumptions that they would somehow misuse the technology because of bodily or cognitive deficiency.

However, also noteworthy is a lack of identification with one’s technology across these older adults, regardless of their age or ability level. Throughout the research process, participants voiced fears of becoming too attached to or dependent on their technology, and these fears were reflected through the language that they used to describe their devices. As a millennial researcher, I tended to use possessive determiners (e.g., your, his, my) to refer to devices when speaking with these participants (e.g., “how do you do that with *your* laptop,” “when I am using *my* smartphone, I click this”). Conversely, participants tended to use indefinite

articles (e.g., the, a, that), even when referring to the devices that they privately owned (e.g., "I use *the* iPhone to check my stocks;" "when reading news on *a* computer, I prefer CNN"). These linguistic differences reflect a clear generational divide, where older adults are separating themselves from their devices through the words that they use to disassociate themselves from their technology (either deliberately or unconsciously). The older adults participating in this study did not see their technology as extensions of themselves and did not wish to be identified by it; hence, they rarely customized it. Participants noted that they had not considered changing settings on their browser, or that they were not aware that they could modify their homepage, magnify the text, or install ad blockers to customize their browsing experience.

These fears of technological dependence can pose significant barriers, not only to technology designers seeking to design or market products to older age cohorts, but also to older adults themselves as they seek to participate in digital life. Studies that investigate users' values and motivations behind computing can further pinpoint the causes of these generational differences, so that designers can move towards solutions for an age-diverse user population.

Information Literacy

The importance of critical understanding of how to locate, evaluate, and apply information both on and offline is well documented in theory and research across disciplines. Because of a lack of formal training in information literacy, older adults can be especially vulnerable to misinformation and disinformation, fake news, scams, fraud, and other digital privacy and security breaches. Indeed, avoiding such scams and fraud represents a top priority for AARP, the largest special interest group for older adults in the US: as of February 2022, the AARP Fraud Resource Center tracked 70 different types of scams, from fake QR codes to ransomware.

Beyond the immediate financial or data security danger posed by scams, older users also face deeper information literacy problems when attempting to differentiate between legitimate content and misinformation or deliberate disinformation—or even just trying to pick the best search result for their query out of a list of suggestions, as the participants in this study experienced. Most frequently, these types of issues surfaced when a participant interacted with sponsored content (e.g., paid placements or advertisements) or sought an authoritative answer to a question online. For instance, though Walter included "IRS" in his search query for Task 5, he still clicked through to a result for a paid income tax preparer service, rather than a government document. Moreover, though he identified Wikipedia as a preferred source of information because it was frequently updated, he was unaware that the site was unmoderated and its entries often written by non-experts.

Addressing these gaps in information literacy for older adults necessitates a multi-pronged approach. Though younger age cohorts likely receive extensive K–12 instruction on technology use and digital literacy, adults aged 65+ are less likely to have formal training on basic internet use, let alone on retrieving specialized information using advanced search strategies, identifying and understanding targeted advertisements, and safeguarding their personal data. Technical communicators are well positioned to design educational content in the form of help guides, infographics, and instructional videos to build older adults' critical information literacy.

Deceptive Patterns

Though specialized training in information literacy can help older adults identify and validate legitimate sources of information, additional work is also needed in communication design and information architecture to both promote authoritative content and discourage misleading or predatory practices. Design elements or tricks that deceive users into taking actions that may harm them, their data, and/or their security are increasingly common; UX designers initially referred to them as "dark patterns" (Gray et al., 2018; Trice & Potts, 2018) but later shifted to the phrase "deceptive patterns" as an anti-racist alternative (Brignull, 2022; Intuit Content, 2022). Two specific deceptive patterns emerged during the final two tasks in this study: forced action through installing a plugin that could lead to a breach in user privacy and a disguised ad pattern leading to what I describe as a "sponsored content loop."

In their analysis of deceptive patterns identified by UX practitioners, Gray et al. (2018) framed *forced action* as "any situation in which users are required to perform a specific action to access (or continue to

access) specific functionality" (p. 8). Although Gray et al. provided examples of forced action that involve users sharing more information about themselves that they might typically give, or even agree to selling information across platforms, a more insidious version emerged for three of the participants in the present study as they attempted to use mapping tools for Task 4. An online mapping website, mapsanddirections.com, would not display results for Walter's, Agatha's, or Daisy's search queries unless they installed multiple plugins on their computers, including a maps widget and a "search encryption and privacy" extension. Though Walter and Agatha immediately understood that the site could install malware on their machines (and consequently closed their browser windows when confronted with the pop-up), Daisy clicked "allow" on the install dialogue without questioning. Daisy's difficulty identifying this threat to her device security and personal data exemplifies the potential risks posed by forced action to older adults, who may not have been taught to read and reflect before clicking a button that could install malicious software or compromise sensitive data.

Gray et al. (2018) briefly noted disguised advertisements as another deceptive pattern that "deals more directly with form than function" (p. 7), but when these advertisements appear to be legitimate results from a search provider, they can impede the function of the search engine as well. It can be especially difficult for older adults to separate an advertisement from a true search result on Google because of the lack of clear visual differentiation between these types of content: an advertisement may have "Ad" written next to its URL in black type or circled in green, both of which can be easy to gloss over when a user is scanning the page or hard to identify if that user has low vision or limited color perception (both of which occur more frequently as people age). Sometimes, these advertisements simply link to results on a less prominent search engine for the same query that the user has just typed in. This paid placement tactic seeks to funnel traffic to these sites but can lead to daisy-chain advertisements when the next search engine too provides a series of ads as the top results for the query, which links to another search engine's results. When working on Task 5, Daisy fell into this "sponsored content loop," with Google's top result for her query about deductions for medical expenses directing her to the same query at Information Vine (another search provider), which then directed her to results at Ask.com, which then directed her to results at Metacrawler.com. The sponsored content loop represents a deceptive pattern that can lead to frustration for users, believing that their inability to find answers to their questions is their fault, when the blame falls squarely on the designers of the interface.

Mental Models and Knowledge Gaps

Users construct mental models, or beliefs and ideas about how an interface works, based on both real and imagined experiences (Nielsen, 2010). Building an understanding of users' mental models is essential for architecting experiences that meet their needs and that they will interact with (see Rosenfeld et al., 2015, pp. 40–51). Mismatches between designers' and users' models can lead to friction for users when the functionality or steps to operate features are unclear—this is one of the key tenets of user-centered design and user research practice. The experiences of the older adults in this study sample shed light on a different type of mental model mismatch: where users' mental models are incomplete, incorrect, or even entirely nonexistent.

Participants' journeys through the browser homepage, mapping, and government document tasks demonstrate consistent and persistent gaps between their ability to do things and their understanding of how those things worked or what they were called. Even those who were able to finish most of the tasks often struggled to describe how they were successful: they just did it. This gap illustrates a divide between *declarative* and *procedural* knowledge. Declarative knowledge involves facts and things, whereas procedural knowledge is the knowledge of how to do something or perform an activity. For example, Susan noted during her session that she regularly synced her laptop's data to the cloud using Carbonite, a backup program, but admitted that she did not fully understand what the cloud was or how it worked. Although she recognized that cloud computing and storage were important concepts, she lacked the mental model or vocabulary to describe or conceptualize them.

Susan's ability to back up her data without understanding where it was backed up to represents *procedural* understanding, rather than *declarative.* Procedural knowledge is often noted as "automatic" or unconscious in nature, with users performing activities without necessarily recognizing that they know *how*

to do something or explain it. Declarative knowledge, conversely, is conscious and explicit (Soliman, 2018; ten Berge & van Hezewijk, 1999). During the task analyses, multiple participants attested that they did not know what a homepage was, despite having interacted with their homepage on their internet browser on a daily or weekly basis. Their computer and internet start-up process, as well as their typical daily activities (usually checking email and/or social media, looking at homepage news and stories, etc.) had become almost mechanical—to the point where they had to "stop and think" about their routine when asked to demonstrate their typical usage.

These results demonstrate that declarative knowledge does not necessarily have to precede procedural knowledge, but the interplay between the two can further enrich the ability to complete computer-based tasks and participate in digital life. The automated nature of procedural knowledge became apparent when I used technical terminology or asked participants to explain how they went about completing tasks. Moreover, employing strategic metaphors or comparisons (e.g., "fast internet is like an expensive sports car, whereas a slow connection is like an old clunker;" "this website protects your data with two-factor authentication, like a store asking for your ID before they run your credit card") helped to build users' declarative understanding of how interfaces worked or why they were the way they were or bring their tacit knowledge to the surface. Developing a robust understanding of the principles and mechanisms underpinning these interfaces can in turn improve usage for all.

CONCLUSION

The study presented in this article sheds light on the interface design features that help and hinder the fastest growing segment of the population: older adults. Though the results of this study are localized to a particular community of the "oldest old," they hold broader, more global implications for research and practice. As practitioners have noted, a five-participant sample size is an effective number for most user testing and heuristic evaluation studies, revealing 80% of the usability issues with an interface (Rubin & Chisnell, 2008). Furthermore, interventions made to improve the experiences of septua- and octogenarians (aged 70–80 and 80+, respectively) are ultimately investments in everyone's technological future, as all users are always, already aging. In this way, designing for old age and addressing these issues of personalization, information literacy, deceptive patterns, and mental models provides the ultimate opportunity for glocalization: considering local conditions to design for global change.

However, aging is not an experience that is the same for all people in all places; thus, the findings of this research are limited *global* perspectives, given the privileged standpoint of the study participants. These users belonged to a resource-rich retirement community and, as such, their experiences represent a best-case scenario of technology access and support. Moreover, they belong to the oldest cohort of technology users; though their experiences are likely not the same as those of their younger counterparts (e.g., users aged 65–75), studying their journeys and interactions can ultimately inform design that benefits the generations behind them (a practice that should become standard in our field). This type of generational design practice could seek to study the user experiences of generations "up the line" to construct technology that ages with users "down the line." Finally, technology access and use differ across geographic and cultural contexts, so caution should be exercised when applying these results to older adults in other regions and nations. Again, glocalization provides an excellent opportunity for balancing between the universalities of age and the local contexts of individual communities and cultures.

As these limitations and the review of previous work on age and technical communication demonstrate, our field has much work ahead to expand knowledge of older adult users. Future studies in this area can investigate older adults' experiences with specific types of interfaces, such as telehealth apps or online shopping. Moreover, as with any population of users, older adults' digital lives are not merely task-oriented, but rather involve a myriad of activities mediated by social interactions, cultural legacies, and access to economic and technological capital. Thus, further studies should probe the user stories and journeys of older adults from a variety of communities, and further advocacy should support their usage and the design of interfaces that match their needs. To make computing truly sustainable and "future-proof" it (Wilkinson & Gandhi, 2015) for generations to come, technical communicators and UX designers should look

to today's oldest users to understand the intersections between aging and technology.

ABOUT THE AUTHOR

Dr. Allegra W. Smith is an assistant professor of professional writing at Jacksonville State University, where she coordinates the English Internship Program. She teaches, researches, and mentors in the design of communication, online writing instruction, and user experience. Her dissertation, *Digital Age: A Study of Older Adults' User Experiences with Technology*, was honored by *Computers and Composition* with the 2021–22 Hugh Burns Dissertation Award. Dr. Smith can be reached at awsmith@jsu.edu.

REFERENCES

Administration on Aging. (2021). *2020 profile of older Americans*. U.S. Department of Health and Human Services. https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf

Agboka, G. Y. (2013). Participatory localization: A social justice approach to navigating unenfranchised/disenfranchised cultural sites. *Technical Communication Quarterly*, *22*(1), 28–49. https://doi.org/10.1080/10572252.2013.730966

Anderson, M., & Perrin, A. (2017, May 17). *Tech adoption climbs among older adults*. Pew Research Center. https://www.pewresearch.org/internet/2017/05/17/tech-adoption-climbs-among-older-adults

Barnum, C. (2002). The 'magic number 5': Is it enough for web-testing? *Information Design Journal*, *11*(2–3), 160–170. https://doi.org/10.1075/idj.11.2.08bar

Breuch, L. A. K. (2015). Glocalization in website writing: The case of mNsure and imagined/actual audiences. *Computers and Composition*, *38*, 113–125. https://doi.org/10.1016/j.compcom.2015.09.009

Brignull, H. (n.d.). *Deceptive design—Formerly darkpatterns.org*. Deceptive Design. https://www.deceptive.design

Chisnell, D. E., Redish, J. C., & Lee, A. (2006). New Heuristics for Understanding Older Adults as Web Users. *Technical Communication*, *53*(1), 39–59.

Cleary, Y., & Flammia, M. (2012). Preparing technical communication students to function as user advocates in a self-service society. *Journal of Technical Writing and Communication*, *42*(3), 305–322. https://doi.org/10.2190/TW.42.3.g

Cooke, L. (2010). Assessing concurrent think-aloud protocol as a usability test method: A technical communication approach. *IEEE Transactions on Professional Communication*, *53*(3), 202–215. https://doi.org/10.1109/TPC.2010.2052859

Crow, A. (2002). Computers and aging: Marking raced, classed and gendered inequalities. *Journal of Technical Writing and Communication*, *32*(1), 23–44. https://doi.org/10.2190/EN39-2T10-HEAY-BKTN

Czaja, S. J., Boot, W. R., Charness, N., & Rogers, W. A. (2019). *Designing for older adults: Principles and creative human factors approaches* (3rd ed.). Taylor & Francis. https://doi.org/10.1201/b22189

Freund, O., Reychav, I., McHaney, R., Goland, E., & Azuri, J. (2017). The ability of older adults to use customized online medical databases to improve their health-related knowledge. *International Journal of Medical Informatics*, *102*, 1–11. https://doi.org/10.1016/j.ijmedinf.2017.02.012

Gray, C. M., Kou, Y., Battles, B., Hoggatt, J., & Toombs, A. L. (2018). The dark (patterns) side of UX design. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–14. https://doi.org/10.1145/3173574.3174108

Hackos, J. T., & Redish, J. C. (1998). *User and task analysis for interface design*. John Wiley & Sons, Inc.

Intuit Content. (2022). *Dark UX, dark patterns*. Word List | Resources | Intuit Content Design System. https://contentdesign.intuit.com/resources/word-list/#dark-ux

Johnson, R. R. (1998). *User-centered technology: A rhetorical theory for computers and other mundane artifacts*. SUNY Press.

Jones, N. N. (2016). The technical communicator as advocate: Integrating a social justice approach in technical communication. *Journal of Technical Writing and Communication*, *46*(3), 342–361. https://doi.org/10.1177/0047281616639472

Kappen, D. L., Mirza-Babaei, P., & Nacke, L. E. (2020). Older adults' motivation for physical activity using gamified technology: An eight-week experimental study. In *International Conference on Human-Computer Interaction* (pp. 292–309). Springer. https://doi.org/10.1007/978-3-030-50249-2_22

Lippincott, G. (2004). Gray matters: Where are the technical communicators in research and design for aging audiences? *IEEE Transactions on Professional Communication*, *47*(3), 157–170. https://doi.org/10.1109/TPC.2004.833687

Livingston, G. (2019, June 18). *Americans 60 and older are spending more time in front of their screens than a decade ago*. Pew Research Center. https://www.pewresearch.org/fact-tank/2019/06/18/americans-60-and-older-are-spending-more-time-in-front-of-their-screens-than-a-decade-ago

Loorbach, N., Karreman, J., & Steehouder, M. (2007). Adding motivational elements to an instruction manual for seniors: Effects on usability and motivation. *Technical Communication*, *54*(3), 343–358.

Loorbach, N., Karreman, J., & Steehouder, M. (2009). Boosting seniors' confidence by enhancing user instructions. *2009 IEEE International Professional Communication Conference* (pp. 1–7). IEEE. https://doi.org/10.1109/IPCC.2009.5208702

Loorbach, N., Karreman, J., & Steehouder, M. (2013a). Confidence-increasing elements in user instructions: Seniors' reactions to verification steps and personal stories. *Technical Communication*, *60*(3), 190–204.

Loorbach, N., Karreman, J., & Steehouder, M. (2013b). Verification steps and personal stories in an instruction manual for seniors: Effects on confidence, motivation, and usability. *IEEE Transactions on Professional Communication*, *56*(4), 294–312. https://doi.org/10.1109/TPC.2013.2286221

Mannheim, I., Schwartz, E., Xi, W., Buttigieg, S. C., McDonnell-Naughton, M., Wouters, E. J. M., & van Zaalen, Y. (2019). Inclusion of older adults in the research and design of digital technology. *International Journal of Environmental Research and Public Health*, *16*(19), 3718. https://doi.org/10.3390/ijerph16193718

Militello, L. G., & Hoffman, R. R. (2008). The forgotten history of cognitive task analysis. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 52*(4) 383–387. https://doi.org/10.1177/154193120805200439

Nielsen, J. (2010). *Mental models*. Nielsen Norman Group. https://www.nngroup.com/articles/mental-models

Nielsen, J. (2012a). *How many test users in a usability study?* Nielsen Norman Group. https://www.nngroup.com/articles/how-many-test-users

Nielsen, J. (2012b). *Thinking aloud: The #1 usability tool*. Nielsen Norman Group. https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool

O'Hara, K. (2004). "Curb cuts" on the information highway: Older adults and the Internet. *Technical Communication Quarterly*, *13*(4), 426–445. https://doi.org/10.1207/s15427625tcq1304_4

Ortman, J. M., Velkoff, V. A., & Hogan, H. (2014). *An aging nation: The older population in the United States* (No. P25-1140; pp. 1–28). U.S. Census Bureau. https://www.census.gov/prod/2014pubs/p25-1140.pdf

Redish, J. (2010). Technical communication and usability: Intertwined strands and mutual influences. *IEEE Transactions on Professional Communication*, *53*(3), 191–201. https://doi.org/10.1109/TPC.2010.2052861

Ritzer, G. (2003). Rethinking globalization: Glocalization/globalization and something/nothing. *Sociological Theory*, *21*(3), 193–209. https://doi.org/10.1111/1467-9558.00185

Robertson, R. (1994). Globalisation or glocalisation? *Journal of International Communication*, *1*(1), 33–52. https://doi.org/10.1080/13216597.1994.9751780

Rose, E. J. (2016). Design as advocacy: Using a human-centered approach to investigate the needs of vulnerable populations. *Journal of Technical Writing and Communication*, *46*(4), 427–445. https://doi.org/10.1177/0047281616653494

Rosenfeld, L., Morville, P., & Arango, J. (2015). *Information architecture: For the web and beyond* (4th ed.). O'Reilly Media, Inc.

Roudometof, V. (2016). Theorizing glocalization: Three interpretations1. *European Journal of Social Theory*, *19*(3), 391–408. https://doi.org/10.1177/1368431015605443

Everyone Is Always Aging

Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing: How to plan, design and conduct effective tests* (2nd ed.). Wiley & Sons.

Salvo, M. J. (2001). Ethics of engagement: User-centered design and rhetorical methodology. *Technical Communication Quarterly*, *10*(3), 273–290. https://doi.org/10.1207/s15427625tcq1003_3

Schwender, C., & Köhler, C. (2006). Introducing seniors to new media technology: New ways of thinking for a new target group. *Technical Communication*, *53*(4), 464–470.

Smith, A. (2014). *Older adults and technology use*. Pew Research Center. http://www.pewinternet.org/2014/04/03/older-adults-and-technology-use

Soliman, S. A. H. (2018). *Systems and creative thinking*. Center for Advancement of Postgraduate Studies and Research in Engineering Sciences (CAPSCU). http://www.pathways.cu.edu.eg/subpages/Creativity-Engine.htm

Spinuzzi, C. (2005). The methodology of participatory design. *Technical Communication*, *52*(2), 163–174.

Sun, H. (2012). *Cross-cultural technology design: Creating culture-sensitive technology for local users*. Oxford University Press.

ten Berge, T., & van Hezewijk, R. (1999). Procedural and declarative knowledge: An evolutionary perspective. *Theory & Psychology*, *9*(5), 605–624. https://doi.org/10.1177/0959354399095002

Trice, M., & Potts, L. (2018). Building dark patterns into platforms: How GamerGate perturbed Twitter's user experience. *Present Tense: A Journal of Rhetoric in Society*, *6*(3). http://www.presenttensejournal.org/volume-6/building-dark-patterns-into-platforms-how-gamergate-perturbed-twitters-user-experience

U.S. Census Bureau International Programs. (2020). *An Aging World: 2020*. United States Census Bureau. https://mtgisportal.geo.census.gov/arcgis/apps/MapSeries/index.html?appid=3d832796999042daae7982ff36835e2e

Van der Geest, T. (2006). Conducting usability studies with users who are elderly or have disabilities. *Technical Communication*, *53*(1), 23–31.

van Horen, F. M., Jansen, C., Maes, A., & Noordman, L. G. M. (2001). Manuals for the elderly: Which information cannot be missed? *Journal of Technical Writing and Communication*, *31*(4), 415–431. https://doi.org/10.2190/88JW-J0HG-3H5E-JAH9

Walters, S. (2010). Toward an accessible pedagogy: Dis/ability, multimodality, and universal design in the technical communication classroom. *Technical Communication Quarterly*, *19*(4), 427–454. https://doi.org/10.1080/10572252.2010.502090

Walton, R., Moore, K., & Jones, N. (2019). *Technical communication after the social justice turn: Building coalitions for action*. Routledge.

Wilkinson, C., & Gandhi, D. (2015). Future proofing tomorrow's technology: UX for an aging population. *User Experience Magazine*, *15*(1). http://uxpamagazine.org/future-proofing-tomorrows-technology

Do Voices Really Make a Difference? Investigating the Value of Local Video Narratives in Risk Perceptions and Attitudes Towards Sea-Level Rise

doi: https://doi.org/10.55177/tc105639

By Daniel P. Richards and Sonia H. Stephens

ABSTRACT

Purpose: The authors present the results of an empirical study investigating strategies for localizing risk messaging pertaining to sea-level rise (SLR) and flooding. We argue that continued testing is necessary to help bolster arguments about the value of localization design practices and that technical communication as a field is positioned well to lead the charge in such testing.

Method: The authors conducted a mixed methods research study to discover whether video stories from local residents change user perceptions or concern about SLR as a risk. More than 100 survey responses were collected to track any relation between concern and understanding and modality of storytelling, and focus groups were led with 13 survey respondents to add a deeper understanding of effective strategies for localization.

Results: The data show that video and textual storytelling do not differ as much as expected in the context of decision-support tools for SLR.

Conclusion: Although video narratives for localization did not affect user perception or concern about SLR more strongly than text quotes did, participants felt that the localization efforts were compelling. Participants suggested ways in which both video and textual narratives might be more effectively used to support audiences' understanding of SLR. As a result of their suggestions, we note future research topics and testing methods to explore risk localization best practices.

KEYWORDS: Risk communication, Sea-level rise, Localization, Video narratives, User experience

Practitioner's Takeaway

- User experience testing results in this study find that videos are not substantially more effective than text in creating an effective and localized risk communication.
- More refined methods need to be implemented for conducting user experience testing for localization in risk communication, e.g., through scenario-based testing.

Do Voices Really Make a Difference?

INTRODUCTION

Few topics in technical communication (TC) straddle global and local regions with more urgency than climate change and sea-level rise (SLR). Scholars and practitioners in risk and environmental communication have the challenging goal of scale, rendering global data on climate change and SLR meaningful to the specific local communities that will be most affected. This problem of scale is more challenging because much climate change and SLR data are derived from modeling future conditions, which present a temporal disconnect from present-day lived experience (Herring et al., 2017). In coastal communities, the communicative challenges of spatial scale and temporal immediacy can sometimes be bridged by linking observed phenomena (e.g., street flooding, stronger hurricanes) with global trends to facilitate residents' buy-in and engagement with mitigation practices and resilience mindsets. Such engagement can, in turn, support individual and community agency in affected areas (Schneider & Walsh, 2019).

In this study, we focus on web-based SLR communication through which technical communicators can intervene in risk communication by adding a local, human dimension to global, impersonal data. Risk communication researchers have examined ways in which place-centered information visualization can motivate audiences' engagement with and concern for environmental hazards. For example, audiences who view augmented-reality simulations of the place-based impacts of climate change experienced increased concerns about climate change and interest in learning more about flooding risk and mitigation options (Moser et al., 2016). Other research, however, has found that, although interacting with mapped climate data led to stronger certainty that climate change is real, users' own proximity to a specific location did not affect climate-change-related attitudes and beliefs (Herring et al., 2017). Additional research (e.g., Moser, 2010; Nicholson-Cole, 2005; Retchless, 2018) has pointed to the complexity of this communicative challenge.

Other studies have examined the role of narrative in environmental risk communication. Research on textual narratives for risk communication analyzed the differences in how laypeople, particularly those in indigenous communities, share narratives about climate change, as compared to the factually-oriented narrative style that Western science-oriented organizations tend to favor (Lejano et al., 2013). In further testing differences in narrative structure and forms of address between lay and scientific communication in emergency text messages, researchers found that residents' concern and motivation to act are stronger after viewing messages with a more personal narrative style (Lejano et al., 2018). Taking a different approach, Butts and Jones (2021) developed an augmented reality app for a specific location; the app incorporated both textual and visual narrative elements—including elements focused on environmental risk—as a deep mapping project intended to share multiple perspectives of a place.

In this paper, we explore how localization can help us develop more engaging, informative, and audience-empowering environmental risk communications. Within TC, localization has been discussed primarily as a process to tailor products to the needs of specific cultural groups by careful consideration of function and application to real-world tasks and to sociocultural contexts (Sun, 2006). However, designing for these aspects of localization is complex, particularly for sociocultural factors that cannot be addressed by language translation (e.g., Agboka, 2013). Therefore, technical communicators have called for adopting user-centered and participatory design strategies as a partial solution to the challenges of cultural localization (Agboka, 2013; Shivers-McNair & San Diego, 2017; Sun, 2006).

Localized environmental risk communication efforts need to consider a range of place-specific social, economic, and physical factors. For example, many coastal communities thus far experience SLR primarily as nuisance flooding that impacts quality of life or as erosion that impacts property values, whereas life-threatening flooding that occurs during storms is rare. However, long-term residents' experiences of rare flooding events may be a good guide as to the types of impacts that residents will experience on a more frequent basis as SLR accelerates over the next few decades (Sweet et al., 2022).

In this study, our goal is to examine the assumption that adding the voices of local residents to a data-driven SLR visualization tool via videos makes environmental risk communication more effective as a localization technique. Although TC work supports the assumption that local perspectives can help audiences connect with large-scale data, research that tests the efficacy of

localizing interventions is needed to understand what might be achieved by these efforts. The relationship between the local experience of environmental problems and the global factors—both environmental and societal—that cause those problems is complex. In the context of designing environmental monitoring technologies, "there is a compelling need to oscillate from local participants' experiences [to a more] globally connected experience" (Sackey, 2020, p. 45).

We focus our efforts on communication that makes use of interactive online mapping tools that are intended to help local communities understand their SLR-related risks. Specifically, we look at the effects of localization on website users' concern and perceptions of personal agency about SLR. This study builds on previous research in which we theorize about localization in the design of a SLR communication tool by adding video-recorded personal stories about flooding to a national interactive SLR map using a story mapping tool (Stephens & Richards, 2020). In this study, we move from design to testing, and we share the results of user experience (UX) research investigating the unique effect of inserted videos of local residents on user perceptions of risk and attitudes towards climate change and SLR. Our specific questions are:

- Do video narratives of local residents sharing their concerns about SLR help other community members relate to its potential effects on their communities?
- How, if at all, do the effects of using video narratives for localization differ from the effects of using residents' quotes for localization?
- What particular features and elements might make video narratives more effective in communicating about the potential effects of SLR on a community?

Our overall objective is to provide guidance for TC researchers and practitioners who are interested in incorporating video narratives into their localization practices, particularly in the context of environmental or location-specific risks.

METHOD

Methods were evaluated by the first author's Institutional Review Board and approved for this study. We obtained user feedback on two versions of the website *SLR Stories* using a two-part procedure. First, we distributed an unmoderated survey that targeted certain aspects of the two websites and asked users to comment on website design and their interpretation of the website information. The survey helped us identify any differences in levels of concern between those exposed to the video version and those exposed to the text-only version (which excerpted printed quotes from the video transcripts). Second, we followed up with participants to conduct focus groups to parse out the qualities of the videos or text that engaged the participants and to investigate those qualities. Given careful attention to process and participant interactions, focus groups encourage the free sharing of viewpoints in a conversational format, which can lead to unplanned insights and minimize researcher biases (Lune & Berg, 2017).

Methods were informed by A/B testing, commonly used in UX (Lindberg, 2020) to show two or more variants of a design to users at random to identify which one performs better. In our case, we were not interested in which one performs better in terms of efficiency or in terms of traditional usability metrics. We used A/B testing to isolate the effect of video stories in terms of levels of concern about the risk of SLR and flooding in the region at hand.

SLR Stories Websites

Two modified versions of the *SLR Stories* website (described in Stephens & Richards, 2020) were created: one with videos of local residents talking about their SLR-related concerns and one with quotations (in text) from local residents (instead of videos). Both versions of the website were constructed with Esri's Story Map software and consist of a series of story segments that users scroll through. The video version (Richards & Stephens, 2021a) contained four segments:

1. Description of the website, introduction to the project, and photo of Norfolk, in the Hampton Roads region of southeast VA, USA (see Figure 1 for geographical location).
2. Description of SLR projections for the Hampton Roads area, interactive NOAA SLR Viewer map, description of how to use the map, and short video interviews of four area residents.
3. List of actions readers can take regarding SLR and photo of the Norfolk beach.
4. Contact page for the authors and photo of a seaside historic site.

Figure 1. Map showing the location of the Hampton Roads region (Hampton Roads Alliance, 2021)

In the non-video version (Richards & Stephens, 2021b), the videos are replaced with a single quote from each resident and a non-interactive map showing the locations of the interviewees' homes. All other text and images are the same. (See the video and non-video versions of the site in Figure 2 and Figure 3, respectively.)

UX Test

The first part of the project was a UX test consisting of user feedback on the website and an accompanying survey. Participants were recruited by convenience sampling from among the student population of the first author's institution. The website's primary target audience is coastal residents of Hampton Roads, Virginia; not all UX test participants were Hampton Roads residents, but all focus group participants (in the second part of the study) were. Two different recruitment requests were sent to faculty in the department: one with the link to the video version and the other with the link to the non-video version. Faculty were asked to share the recruitment request that they received with their classes and offer extra credit to students who participated. A total of 168 students participated in the UX walkthrough and survey.

We eliminated responses of less than 21 seconds (using Qualtrics' time-on-task metric), leaving 52 responses for the video site and 52 responses for the non-video site. We chose the 21-second cutoff for two reasons: we thought it best for the sake of comparison to have the same number of participants in each group, and anything less than ~20 seconds indicated that the participants did not engage with the video (even those that were 20–30 seconds likely did not get the full video experience). Due to pandemic restrictions, the survey was unmoderated; therefore, it was expected that participants would move quickly through it.

Seventy-eight participants were located in Hampton Roads (38 for the video version and 40 for the non-video version); 19 were in VA but outside Hampton Roads (11 video, eight non-video); and five were outside VA (three video, two non-video).

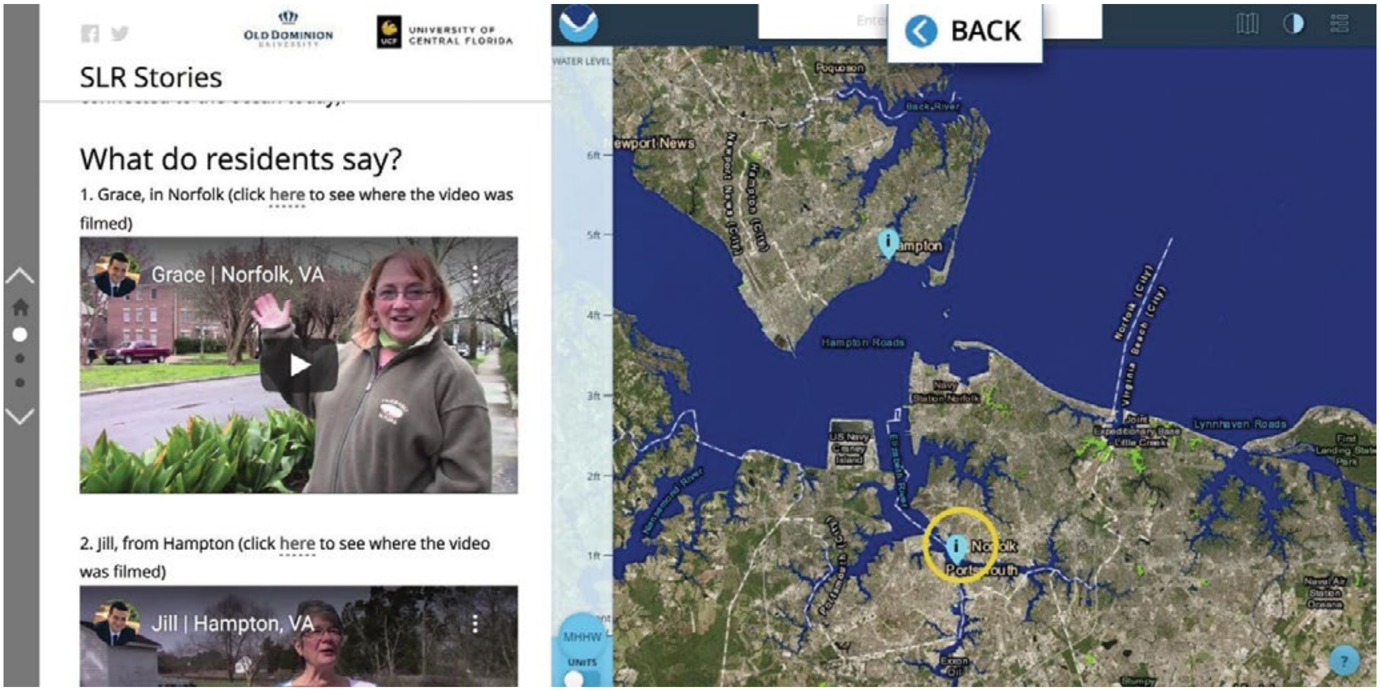


Figure 2. Screenshot of the video version of *SLR Stories*, showing Grace's video on the left, and the location of her home on the right

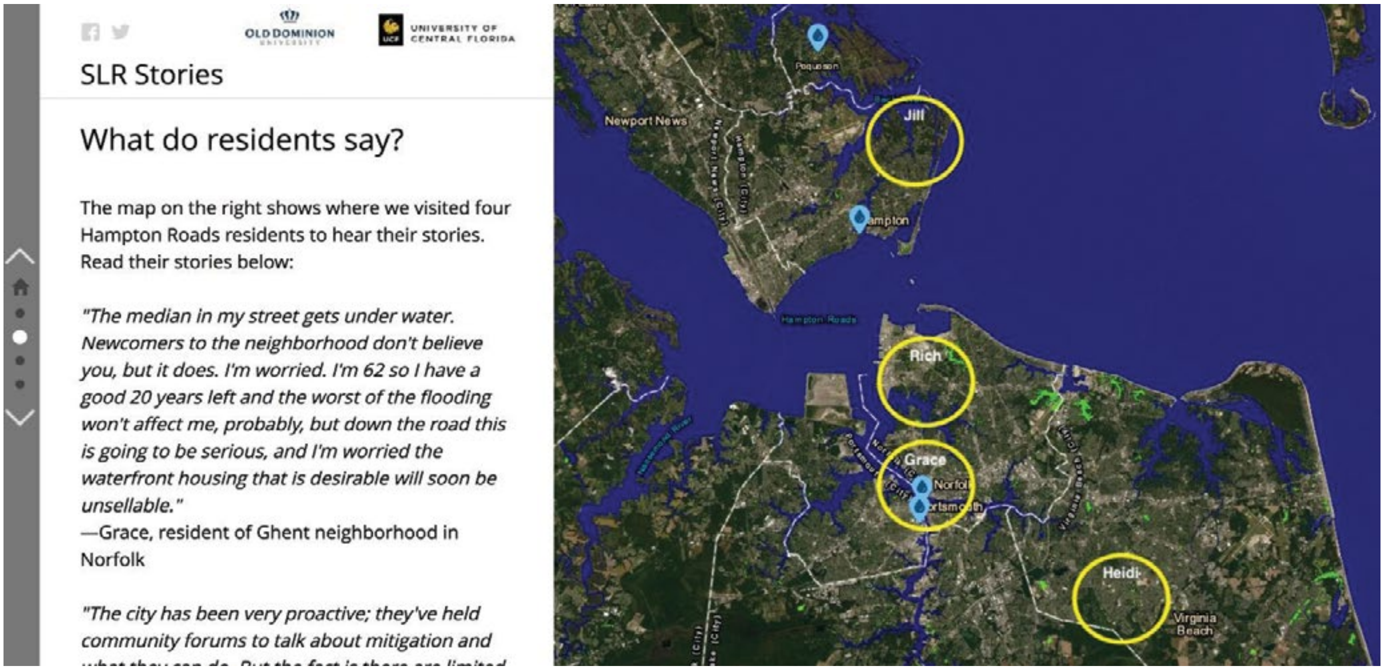


Figure 3. Screenshot of the non-video version of *SLR Stories*, showing a quote from Grace on the left and the locations of all participants' homes on the right

Participants' racial and ethnic demographics (Table 1) generally reflected the demographic breakdown of the Hampton Roads region, though our study had a slightly lower percentage of white participants than would be expected in a random sampling of the region. We acknowledge issues of access and privilege in our study, as our participants, although racially and ethnically diverse, are relatively privileged, with access to technology, moderate educational levels, and the means to take action. In this respect, our participants might not be reflective of community residents who lack that same level of privilege.

Table 1. Survey participant demographics

Age (in years)	Video version	Non-video version
18–25	34	34
26–39	12	10
40–54	5	5
55+	1	1
Race/Ethnicity	**Video version**	**Non-video version**
Hispanic, Latino, or Spanish origin of any race	6	3
American Indian or Alaskan Native	0	0
Asian	3	1
Native Hawaiian or other Pacific Islander	0	0
Black or African American	14	16
White	24	25
Two or more races	5	5

Note: n = 52 for video version of the website, n = 50 for non-video version

Participants were first asked to read the website text and interact with the interactive SLR viewer while answering questions aimed at characterizing their understanding of the causes of SLR, its current effects on Hampton Roads, and its possible global and local effects. Questions were divided among those that could be answered by interacting with the website and those that assessed broader understanding of the causes of SLR (modified from Priestly et al., 2021).

Next, participants were asked to either watch the videos or read the quotes, depending on the version of the website they were viewing. After reviewing the content, participants were asked about their levels of concern with SLR and their opinions about its causes, whether they had been affected by SLR and if so how, and if they had taken or anticipated taking actions to mitigate or adapt to it within the next 5–10 years and if so what actions. Finally, they were asked for general comments about the project and whether they would be interested in participating in a future focus group discussion.

Focus Groups

Thirteen participants who indicated interest were selected from among the UX survey respondents, and three focus groups, each of four to five people, were conducted over Zoom. Participants were selected to obtain a mix of those who had viewed the video website and the non-video website during the UX walkthrough in each focus group session.

Focus groups were moderated by the first author, who used a semi-structured, open-ended interview guide to prompt discussion of participants' ideas. Throughout the discussion, he remained friendly and non-judgmental and maintained a positive rapport with participants. He opened focus groups with a description of the project's purpose, reminded participants that they had recently filled out a survey about the project, and described focus group procedures, including a request that participants treat the discussion as confidential. Participants were then asked to give their first names, the town they lived in, and something they liked about living in the area.

Participants were briefly shown the *SLR Stories* website to remind them about its structure. Several quotes from the non-video website were read, and participants who had viewed that website were asked what they recalled thinking and feeling about the quotes. Then participants were shown one video from the video website and asked what they recalled thinking and feeling about the video and the concerns raised by the speaker. Participants who had viewed the non-video website were asked whether they would have found videos to be more interesting or relatable than quotes.

After participants responded to the video, the moderator shared three general results about the survey: the number of participants, the overall responses to a question about whether people felt concerned about SLR in Hampton Roads, and the overall responses

to whether people believed that they would need to take any actions to mitigate or adapt to SLR in the next 5–10 years. Focus group participants were asked whether they recalled how they answered that question, why they answered that way, and whether they might answer it differently now.

Finally, participants were asked about their concerns for SLR in the region, whether they had any suggestions for making the resident stories on the *SLR Stories* website more effective to help people understand the possible effects of SLR in Hampton Roads, and whether they thought other types of information might be more effective. To conclude, they were asked whether they had any final thoughts about SLR communication, this project, or the focus group process.

RESULTS

Our results include outcomes from UX surveys and from focus groups.

Survey Results

The survey contained three sets of questions. The first set was aimed at characterizing participants' understanding of the causes of SLR, its current effects on Hampton Roads, and its possible global and local effects. First, when asked how much sea level had risen in the last 100 years in both Hampton Roads and globally, the video and non-video groups showed no major patterns of difference. Both groups selected a wide range of responses, with only 21% correct responses to the question about historic SLR in Hampton Roads (>12 in.) and 24% correct responses to the global question (6–8 in.). When asked to select the top three contributors of SLR from a list, ~61% selected at least one correct "top three" contributor (melting land-based ice sheets, melting glaciers, and thermal expansion of water). The uncertainty or misconceptions in participants' preexisting knowledge was similar to that reported elsewhere in the literature (Priestly et al., 2021). An additional 13% selected land subsidence (sinking), a primary driver of SLR in Hampton Roads but not globally; this was also the only response that varied substantially (25 video viewers versus 15 non-video viewers) between groups.

In the second set, participants were directed to explore the SLR Viewer tool (developed by NOAA) on the right side of the webpage, and particularly the slider in the middle of the page that allows users to increase or decrease water levels. When asked to select the scientifically credible maximum possible amount that sea level could rise in Hampton Roads by 2050, 37% of participants answered correctly (up to 3 ft), with slightly more non-video participants answering correctly. When asked to select the most likely amount that sea level could rise in Hampton Roads by 2050, only 19% of participants answered correctly (up to 3 ft).

In the third set, participants were directed to interact with the personal narratives from local residents. The video group was directed to watch the videos, and the non-video group was directed to read the quotes from local residents along the left side of the *SLR Stories* webpage and observe how the right side identifies their locations. Then both groups answered the same questions about their concerns for (Table 2) and personal experiences with (Table 3) SLR.

Table 2. Participants' concerns about SLR after viewing videos or reading quotes

How concerned do you feel about the sea level rise projected to happen in Hampton Roads, Virginia from now until 2050?		
	Video group (n = 52)	Non-video group (n = 51)
Very concerned	12	12
Concerned	28	21
Neutral	9	8
Not very concerned	1	6
Not concerned at all	2	1
I'm not really sure	0	3
How concerned do you feel about the projected sea level rise's possible effects on you, in your personal or professional life, in the next 5-10 years?		
	Video group (n = 52)	Non-video group (n = 51)
Very concerned	9	11
Concerned	24	19
Neutral	8	12
Not very concerned	7	5
Not concerned at all	3	4
I'm not really sure	1	0

Table 3. Participants' experiences with and expected need to adapt to SLR in the future

Have you already been affected by sea level rise in any way?		
	Video group (n = 52)	Non-video group (n = 51)
No	24	29
Unsure	19	14
Yes (please tell us about it)	9	8
Representative responses related to flooding • My neighborhood routinely floods when it rains heavily. • I experienced the Floyd flood-it was extreme…. I have also had delays with my children's school due to flooding. I have been stranded in Ghent temporarily due to flooding. • There are a few piers around Virginia Beach where my family and I would go fishing. The water is a few inches from reaching the pier and being underwater. • When hurricane season comes, the rise of water level almost entered our home.		
Representative responses related to other issues • Some of my family lives in Puerto Rico, which has been hit with increasingly violent tropical storms I believe are a result of climate change. • Family in Cape Hatteras. • The elevation cert on a property has changed.		
Have you taken any actions in your personal or professional life to mitigate or adapt to sea level rise in any way?		
	Video group (n = 52)	Non-video group (n = 51)
No	36	22
Unsure	12	19
Yes (please tell us about it)	4	10
Representative responses: • Avoidance of low-lying areas, I would never live in a waterside residence. • I try to be aware of my footprint and make a consistent example to my children in this consideration. Examples being able to walk to work school grocery. Material consumption awareness. • Explain to well-meaning Christians that the best source of scientific data is from science, not the church gossip or Fox News. • Moved to a house on a hill outside of a flood zone. • Knowing a few ways to get somewhere. • Moved susceptible stored items to higher elevation.		
Do you think you will need to take any actions in your personal or professional life to mitigate or adapt to sea level rise in the next 5-10 years?		
	Video group (n = 52)	Non-video group (n = 51)
No	18	12
Unsure	22	25
Yes (please tell us about it)	12	14

Table 3. Participants' experiences with and expected need to adapt to SLR in the future

Do you think you will need to take any actions in your personal or professional life to mitigate or adapt to sea level rise in the next 5-10 years?
Representative responses related to housing • Avoidance of low-lying areas, I would never live in a waterside residence. • Prepare to sell all real estate and move. • Verify location of next home purchase not in high risk area. • Well as of right now I live on campus at Old Dominion University which is on the coast and will be damaged if sea levels rise any higher. So I will move back home which is more inland so my car doesn't receive any water damage that could potentially happen living in Norfolk.
Representative responses related to environmentally conscious actions • Yes, but I'm not sure what that looks like since it'll affect everyone in the tidewater region • plant more plants, save energy, reduce emission[s]. • I plan to have electric car. • Being environmental as I can and choosing where to live so my house does not go under water.
Other representative responses • Continuing what I do, possibly getting more into community. • There could be roads that we rely on now that might be obsolete in 50 years. • I think we'll all have this issue top of mind soon. • I live in Northern Virginia and if I were to end up at a job in Washington, DC, rising sea levels could contribute to flooding in that area and could affect jobs. • Right now, I am waiting to see how the actions come. • Considering reactionary measures such as emergency pumps, high water mitigation efforts, etc.

When asked how concerned they felt about the projected SLR for Hampton Roads from now until 2050 (Table 2), more participants from the video group reported being "concerned" than those from the non-video group (28 vs. 21) and fewer reported being "not very concerned" (1 vs. 6). When asked about the projected SLR's possible effects on them in the next 5–10 years, more participants from the video group reported being "concerned" than those from the non-video group (24 vs. 19) and fewer reported being "neutral" (8 vs. 12). Overall, participants were more concerned about the projected SLR by 2050 than about its effects on them in the next 5–10 years.

When asked if they had been affected already by SLR, 51% of participants said "no" and 32% were "unsure," with more video participants being unsure and more non-video participants saying "no" (Table 3). Most examples of being affected that they shared related to flooding. When asked whether they had taken any actions to mitigate or adapt to SLR in any way, 56% of participants said "no" and 30% were "unsure," this time with more non-video participants being unsure or saying "yes" and more video participants saying "no." Examples of actions that they shared included identifying alternate transportation routes, considering flooding while looking for housing, and taking eco-conscious actions or holding environmentally oriented conversations with others. Finally, when asked whether they expected to need to take any actions to mitigate or adapt to SLR in the next 5–10 years, 29% of participants said "no," 46% were "unsure," and 25% said "yes," with more video participants than non-video participants saying "no." Actions that they expect to take include considering flooding while looking for housing, taking more eco-conscious actions, participating in community response efforts, and considering flooding in their future work locations.

Finally, participants in both groups were asked, "Do you have any final comments on this research or the issues raised in it?" Responses addressed

- the importance of this issue (e.g., ". . . this is a serious topic that should be talked about more.")
- uncertainty about where to find accurate information (e.g., ". . . I feel rather uninformed on the issue, an[d] I'm not sure where to get accurate information.")
- concerns about societal priorities (e.g., "Don't worry, we will use our energy (literally) to solve

math problems on a computer for "coins" to trade for money. . .")
- possible personal responses (e.g., ". . . my major and minor are creative writing and environmental science respectively so I might write some science fiction on the subject of global warming and climate change.")
- misconceptions about the underlying science (e.g., " If you have a cup of water with ice and the ice melts. . . the water level is still the same. I would assume the same principle applies.")
- concerns about impacts (e.g., "I am very concerned about the potential for pollution and impact to industry should industrialized areas become flooded")
- comments on their proximity to the issue (e.g., "As someone who doesn't live or have family in that area it is more difficult for me to feel personally affected," "It's something to think about because I'm living so close to the water now.").

Focus Group Results

Focus group transcripts were coded using guidance in the field on coding verbal data (Geisler & Swarts, 2019); the overarching framework was focused on relationships coding (p. 124), with specific attention being paid to the relationships evident and emerging between the participants and the two types of narrative localization strategies. As such, the coding schema (p. 125) was based loosely on the structure of the focus group questions, but with modality (video vs. text) emerging as a more dominant frame given the way the moderator-led discussion and with the moderator consistently trying to lead discussion back to connecting experiences and usability to the integration of stories in the sites. (Table 4 gives an overview of the three main coding frames and the elements within them, providing representative excerpts to support each.) Emphasis was placed on verbal data that linked participant concern directly to the two localization strategies presented on our sites.

Table 4. Focus group coding schema

Frame	Element	Sample Quote (edited for clarity)
Modality (38)	Relatability (12)	You know my impression of [the site, and specifically Grace's video on cars flooding] is it's just very relatable [. . .] We've all been there; we've all sat there in our cars and looked at a street and said: "Can I make it, or should I turn around?" [. . .] When you look on the news and they talk about sea level rise and it's like: "Oh, we're going to have so many inches of sea level rise per year," it doesn't really. . .you can't put it into words. But everyone has sat in a car and looked at a street and said: "Okay, can I make it or not?" And so that's something that I feel like is a very, very, very relatable to everyone, even more so than somebody you know who has a home in a flood zone. There are a lot of people who sit there and say, "Oh, I live in X, Y, and Z—there's no way I am ever going to flood, but everyone has sat there and said: "Can I get my car in and out of the driveway?"
	Understanding (13)	I think I found it most interesting that [in] reading their quotes they are from areas that aren't necessarily right next to the water. You know, when you think about—like as ignorant, as I am, you know, like with all of this—when you think about sea level rise and think more and more of the beach is going to disappear [. . .] That is what I'm thinking of; I'm not thinking of the areas that are further away from the water being impacted by it. I just didn't realize that.
	Concern (13)	I think the videos added a very human touch to it. I feel like text, although powerful in its own way, doesn't quite give this same emotional response as somebody who could be your neighbor, who could be your mom, who could be your best friend.

Table 4. Focus group coding schema (Continued)

Frame	Element	Sample Quote (edited for clarity)
Usability (28)	Effectiveness (14)	So, as far as the videos [. . .] I like the idea of using residents that have had firsthand experiences, but I think also throwing in maybe some videos that have a message from someone who studies this and who . . . can offer us more factual information about what's going on. It is important to hear from residents, and I want that part to stay because I think that's relevant and I think it's important to relay the message, but I also think that some factual kind of educational communication on what's happening, why it's happening, where it's happening, and what it impacts would help too, because I think it would help to give credibility, I guess, to what you're trying to communicate. Is that offensive? I don't mean to offend what you put together. Is that okay?
	Design Features (14)	I actually didn't know that you could go to their locations until after watching all the videos. I would watch one video in full at a time and then I might read around, kind of like when you're reading a magazine: sometimes you don't read it in order. [. . .] I would watch the entire video and then maybe look around the map a bit and go to the next one. But then, after I watched all of them, I think I forgot where the feature was that said where they were on the map, and I was like, "Oh, that actually that puts things even more into perspective,'" so I think I found the map feature last.
Locality (22)	Experience (9)	Well, I can definitely relate [to Heidi] where I live. I actually live in between a golf course and farm fields, so every time it rains it really does take a long time for it to soak up; and part of this is due to just the area itself, it being farmland and there being creeks around. I've noticed because I've lived here for five years now, I've at least noticed that throughout the different storms that it's gotten worse over time.
	Concerns (8)	[I am concerned], mainly just due to just the progression that I've seen over the past years having lived in the area. I mean, don't get me wrong: being in Hampton is totally different than living in Chesapeake. But still, it gets to the point where you're like there's got to be a better way to handle this. I feel like, you know, we kind of got to do something.
	Actions (5)	I don't know if this has anything to do with—I mean, I *think* it does with sea level rise—but . . . I know after the holidays around here and around like the Outer Banks and stuff people take like old Christmas trees and put them in different places where erosion is very rapid, and it helps build the barrier and stuff between water.

Note. Number of coded units associated with each frame and elements are in parentheses.

Focus groups were designed to gather more detail about particular user experiences with the two sites, with the narrower goal of better understanding the role of videos in the design of localization in the context of flood risk. Because participants who used either the video or the text version were grouped together in the focus groups, the investigators were able to gather a more qualitative, descriptive understanding of how users perceived the two strategies. Results are grouped by three frames: modality, usability, and localization.

Modality

In the first portion of the focus group, participants reviewed the sites and then were asked to recall their feelings about the videos and quotes; they were asked if they could relate to the shared concerns, if they understood how SLR might affect residents, and if they felt more concerned after engaging the stories. From the participants' responses, the coding elements that emerged took the form of relatability, understanding, and concern. Once feedback was received on those questions, participants were asked to reflect on the differences between video and text as a storytelling and localization strategy.

Participants overall found both videos and text relatable. All had some SLR-related experience to share, though not necessarily long-term concerns. Most relatability of the storytelling was through places mentioned or through daily lived experiences. Participants did not describe any significant difference

in the way relatability changed or was different from video to text. One participant commented specifically on the value of videos over textual quotes:

> I agree that [the videos] were all very relatable. And I feel like if I had just seen the quotes, I might have been able to relate to an extent, but the videos really made the problem real and you could like actually see their homes and see the areas that that they were referring to, and even, as someone who basically lives on top of a mountain like not in the coastal community, I still felt like I was able to empathize with the issues that they're expressing.

This response came from the only focus group participant who did not live in the region but who was enrolled in courses virtually at the local institution.

Participants shared how they better understood a concept or approach after watching the videos and also discussed how the localization strategies might engender better understanding in others. One participant noted:

> Some people are kind of stubborn, so unless they see it visually, they don't want to believe it. Like for coronavirus, a lot of people didn't believe that was true until they got it. And they saw a lot of people were getting it, and then they started to believe it and then get their vaccine and start protecting themselves. So, I feel like people nowadays are really stubborn and they want to believe things until they actually see with their own eyes. But for this, when they see it with their own eyes, it is going to probably be too late. So, I think if we have a historical vision of what it was like 50 years ago to now, it would be very helpful.

This participant spoke of the visual modality as being potentially influential, perhaps replacing an experiential component in aiding understanding. The "see it to believe it" approach was noted here and throughout other frames as well as a way to highlight urgency or bring people directly into the risk. Some participants implied that a sense of retroactive or historical storytelling was not effective; storytelling in the moment (e.g., live video on social media) or data for historical context seemed to be more effective.

Two participants specifically noted the power of visualization in aiding their understanding of risk. One noted that being able to identify where the water had previously risen would be more instructive than a statement about SLR, and another participant highlighted the affective component of videos as it pertains to understanding:

> . . . seeing the videos would have been better because . . . I need an emotion to go along with how people feel about a certain issue to help me understand it more. And I think that would have been really, really helpful to see the video because I could see the emotion on their faces when they're talking about it, and it would be more impactful to me.

In contrast, other participants felt that the video hindered their sense of understanding content, as potentially being "distracted by the scenery." Others "absorb[ed] more" while reading text.

The final element of the modality frame was coded around participants' responses to whether they felt more concerned after reading the quotes or watching the videos. This question was asked to elicit specific insights into how modality influenced their levels of concern (on a Likert scale) for SLR in the region. One participant noted specifically how watching the video changed their level of concern:

> Yes, like if I wouldn't have seen the videos, I'd probably put neutral, but because I saw the videos, I'm concerned, especially that people have to live like that, where it's like, man . . . like I couldn't imagine coming to my neighborhood and it being a puddle. Like I couldn't imagine that, so yeah: I think watching the videos made me concerned, definitely.

Being unable to imagine something does hint that the videos potentially evoke SLR in a way that text does not, even though the videos did not show poor weather conditions.

Another participant noted the affective dimension in the video, noting how that linked to their concerns:

> I agree—I think the videos added a very human touch to it. I feel like text, although powerful in its own way, doesn't quite give the same emotional response as somebody who could be your neighbor, who could be your mom, who could be your best friend [. . .] I watch these videos and I know that it's in Ghent and it's in Hampton and it's in Norfolk and it's like wow, okay: now I'm actually very concerned, this is very much an issue that needs to be handled now.

Participants seemed to associate themes of imagination and humanity more closely with video storytelling than with text, and they also linked these location-visualizing aspects of the narratives to concern. Other than the preceding examples, participants gave few other details about how modality influenced their levels of concern. We suggest the website may have heightened concern, regardless of video or text, because of its overarching meta-narrative of climate change and (SLR) risk.

Usability

After reflecting on their own experiences, participants were asked how the sites could be more effective in helping people understand SLR in the region. Throughout the focus groups, participants expressed their general likes and dislikes of the site and ways it could be more engaging. Their feedback fell within the topics of effectiveness and changes to design features and was split in terms of positive (effective or designed well in some way) and negative (areas of improvement) comments.

Most of the effectiveness-related responses focused on the lengths and types of videos. One participant noted that the videos were too long, and the "news interview" feel of the videos was appropriate for an older generation but not a younger one that would expect the story to "get to the point" earlier. In that same conversation, one participant noted that they "found the quotes to be short enough to understand what they're saying, so I don't really have any problem with the quotes I mean they're not like long he can read them quickly, so I don't have a problem with that."

Another participant spoke of demographics and the age of the storytellers, noting, ". . . even diversifying the age, that you have a [person who might say], 'Oh that's just the old people problem, like they're just always old people . . . complaining, they're just complaining about something else.'" These comments focused less on comparing effectiveness of videos versus quotes and more on improving the genre, cogency, and relevance of the stories for a younger generation.

One focus group engaged in an interesting conversation about the ethos of the recorded speakers. Three participants discussed the value of having someone from "an elite university" speaking versus a typical resident. One participant suggested speakers should include spokespeople from different groups, like a church leader or military leader, to convince those who are resistant to climate change or SLR. Their implied claim was that showing more educated speakers might be less effective, given who needs to be convinced. Two other participants resisted the educated versus uneducated dichotomy. The design feature, in this respect, was the degree to which the site should have a persuasive quality and more intentionality in who was speaking.

The only other design feedback was about how the usability of the map component would be limited to those living in the area.

Locality

Participants were asked both broadly regional and locally-specific questions about their concerns about future flooding and mitigation efforts. We shared some of the survey responses related to concerns and actions that they think they may need to take with focus group participants, and asked them to share what their survey responses had been and how they would respond now. Many participants from both the video and text groups described flooding that they had experienced, both from storms or nuisance flooding. The presentation of the website during the focus group prompted sharing additional experiences, including lighthearted daily flooding anecdotes and serious concerns for grandparents or other family members living in more vulnerable regions. Concerns about the region were diverse, including infrastructure worries and the participants' futures living in the area. These concerns were not linked to videos versus text.

Finally, perhaps because of the younger demographic of our participants, most shared that they did not know what types of action they might take in response to SLR. They were intrigued by experiences and stories but wanted more guidance on how to act. One participant noted the usefulness of one of the video stories, which suggested ideas and mitigation measures.

DISCUSSION

One of our core questions was whether localized storytelling helps users better engage with and understand SLR and flooding risk when stories are integrated in data-centered, interactive material—the theoretical framework in our previous publication (Stephens & Richards, 2020). One underlying

rhetorical assumption of our storytelling project was that localized narratives at "street level" would be most effective as videos. We wanted to test this assumption and determine if oral history and storytelling must be presented in video format or if users can be offered a similarly-effective choice between video and text. We also wanted to characterize affordances and constraints of the medium selection when attempting to localize risk. In this study, our sample size was small and participants were not selected randomly; therefore, we do not have generalizable answers to these questions. However, from our findings, we can theorize for practitioners who are interested in incorporating narrative elements into risk communication projects and we can suggest future research.

First, we find videos do not necessarily localize risk communication better than textual narratives do, except for specific circumstances. Layperson narratives of climate change often differ structurally from official scientific narratives, presenting a sequence of events and identifiable actors who have agency rather than a list of impersonal truth claims, and those narratives can more effectively connect the public to climate change (Lejano et al., 2013) Although survey results showed that the video group was slightly more concerned about SLR after viewing, the focus group discussion showed a more nuanced response from participants. Some focus group participants—particularly those who did not live in the area—said that the videos personalized SLR, suggesting that videos might help audiences visualize unfamiliar places but might not be valuable beyond text for local residents who have a visual framework. Other participants were skeptical that users would choose to watch an entire non-scripted video of people telling a story.

Second, survey results showed a slight disconnect between concern about environmental issues (like pollution and climate change) and immediate personal concern about safety due to SLR, with more participants being concerned about non-localized issues. Focus group discussions also showed that participants wanted specific suggestions for action and response. Two factors may contribute to these findings: (1) a disconnect between broader issues and localized actions, and (2) participants' perception that they have not yet been affected by SLR. Younger participants, like college students who are a mobile population, may perceive that they can relocate in response to future flooding. In other environmental risk-related research, Sackey (2020) has emphasized the need to connect local experiences to larger-scale policy issues in order to effect meaningful change.

Storytelling in this project did not directly address policy or broader issues with which participants may have been familiar (e.g., carbon emissions). Community stories did facilitate connections between the broader risk of SLR and the everyday experiences and habits of residents in the vulnerable region. But the storytellers were not instructed to make links between the local and the global, nor to address specific actions that they had taken in response to flooding. In the survey and focus group discussions, we presumed that the juxtaposition of the SLR viewer and its open data exploration with stories would make the local–global connection explicit, but we found no evidence of this link, perhaps because of the spatial separation on the sites (stories on the left, data on the right) and because we put the "Actions you can take" page at the end of the website. Thus, our content scripting and organization may not have afforded the intended concrete connections between global risk and lived experiences.

Building on our findings, our intent in the original website design was embedded within the literature on SLR viewers as an emerging genre of web tools (Richards, 2019; Stephens et al., 2014, 2015). These viewers have meta-narratives, with users able to follow historical and projected data and personalize them for specific addresses—to see how much water it would take to inundate their property or landmark of interest. *SLR Stories* included a more "human" voice, which is rare in this type of tool; both oral histories of floods and data-centered tools exist, but few tools merge the two (Richards, 2019; Stephens et al., 2014). Thus, our site combined two types of localization to bring stories "home," using Sun's (2006) thinking about adding cultural contexts to localization technologies (e.g., SLR viewers). However, *SLR Stories* might provide too much information for a user without more explicit direction about how to use and interpret the data, or users may need a website that scaffolds technical information to the audience's level of expertise (Retchless et al., 2021). Alternatively, embedding the stories directly into the SLR viewer, rather than separating content into two halves of the page, might be more effective.

Third, future research is needed to determine what features would make videos more effective as a localization strategy. For example, Lejano et al. (2018) tested a "relational model" of risk communication for typhoon warnings and found that users responded more strongly to text-message warnings that incorporated elements found in face-to-face communication (e.g., second-person voice, stories issued by specific individuals, and narratives with lay language and vivid description). Several respondents in our focus groups noted the potential of these more direct features, specifically mentioning individuals' stories with a certain ethos or group membership. The broader "voices of the community" approach elicited story exchange and facilitated a sense of community in shared experiences among participants, but they often were confused about why these specific individuals were chosen. Clarifying why individuals were chosen to share stories might increase user engagement.

The two parts of the research—surveys and focus groups—provided more findings about engagement. The strong engagement with sharing stories in the focus groups points to the importance of the context of use in which users would be interacting with a website like *SLR Stories*. Participants completed surveys quickly; content included four videos of at least 3 minutes each, yet a majority of survey takers spent 20–30 seconds or less on that part of the survey, demonstrating that they did not take the time to view the entire video. As a result, comparing the levels of concern from videos versus text was challenging to measure. This challenge indicates the importance of following up to understand how viewers might interact with this website in a real-world setting; perhaps only the more motivated users would be interested in watching videos, as opposed to reading short quotes. Additionally, we suggest that a complex website like this might be more productively used in an outreach or community discussion session, in which a trained facilitator helps users explore the tool to spur dialogue on risk mitigation or adaptation.

Fourth, the focus group conversations brought home to us the importance of participatory design, with participants eager to share feedback on improving the effectiveness and usability of the sites. Our project was originally not conceived as a participatory design project (Stephens & Richards, 2020), but as an attempt to connect a large-scale issue to local concerns through place-based stories, as in the broader environmental risk communication literature (Lejano et al., 2018; Moser et al., 2016). As other TC researchers have found, participatory design is key to producing localization strategies that are truly responsive to the needs and desires of community members (Agboka, 2013; Shivers-McNair & San Diego, 2017). Both survey and focus group conversations revealed that participants had a variety of concerns, uncertainties, and misconceptions related to SLR that our community storytellers simply did not address, as well as different information types and formats that they would have wanted to see in an interactive SLR risk communication tool. We also would be interested in future research on affording users with greater options when selecting their preferred medium for engaging in SLR communication (e.g., the option to view either text or videos, or both).

Ultimately, we see from our study that voices make a difference. Our participants engaged with the stories, if only to use them as a springboard to share their own stories (the most common response and theme throughout) during the focus groups. We argue that storytelling as a localization strategy for flood risk can be effective if the storytelling is clear in its intent and intentional per who is speaking and why. The stories in our study were engaging and generative for participants, regardless of medium (video or text), so perhaps stories need not be in video form.

Additional research is needed to corroborate that videos are not the only effective method of localization when designing public-facing SLR tools and to test these tools for user effectiveness. We did not find that participants' levels of concern differed between those who watched the videos versus reading the stories; therefore, larger-scale studies are needed to test this concept, perhaps through a pre- and post-test exposure-testing (quasi-experiment) model. Future research may also expand the participant pool, beyond student participants (who may have less home ownership experience, greater geographic mobility, and more experience with and access to technology than other members of our target audience). Additionally, we suggest more research on how best to tailor stories to help audiences connect to local and global contexts of risk and to provide actionable information that can help build user agency for SLR mitigation and response. Although technical communicators should draw on the risk communication literature for future and similar studies, the localization process also points to the importance of participatory design to help TC

understand the importance of physical, cultural, and social context.

ACKNOWLEDGMENTS

We thank the three reviewers of this article for their careful feedback. We would also like to thank the people in this study, both those telling their stories and those participating in the research. Funding from this project came in part through ACM SIGDOC's Career Advancement Research Grant.

REFERENCES

Agboka, G. Y. (2013). Participatory localization: A social justice approach to navigating unenfranchised/disenfranchised cultural sites. *Technical Communication Quarterly, 22*(1), 28–49. https://doi.org/10.1080/10572252.2013.730966

Butts, S., & Jones, M. (2021). Deep mapping for environmental communication design. *Communication Design Quarterly, 9*(1), 4–19. https://doi.org/10.1145/3437000.3437001

Geisler, C., & Swarts, J. (2019). *Coding streams of language: Techniques for the systematic coding of text, talk, and other verbal data*. University Press of Colorado.

Hampton Roads Alliance. (2021, December 28). *Maps*. Hampton Roads Alliance. Retrieved July 13, 2022, from https://hamptonroadsalliance.com/maps

Herring, J., VanDyke, M. S., Cummins, R. G., & Melton, F. (2017). Communicating local climate risks online through an interactive data visualization. *Environmental Communication, 11*(1), 90–105. https://doi.org/10.1080/17524032.2016.1176946

Lejano, R. P., Casas, E. V., Jr., Montes, R. B., & Lengwa, L. P. (2018). Weather, climate, and narrative: A relational model for democratizing risk communication. *Weather, Climate, and Society, 10*(3), 579–594. https://doi.org/10.1175/WCAS-D-17-0050.1

Lejano, R. P., Tavares-Reager, J., & Berkes, F. (2013). Climate and narrative: Environmental knowledge in everyday life. *Environmental Science and Policy, 31*, 61–70. https://doi.org/10.1016/j.envsci.2013.02.009

Lindberg, O. (2020, January 12). *6 essential tips for A/B testing UX & Design: Adobe XD ideas*. XD Ideas. Retrieved July 13, 2022, from https://xd.adobe.com/ideas/process/user-testing/effective-ab-testing-essential-tips

Lune, H., & Berg, B. (2017). Q*ualitative research methods for the social sciences*. Pearson, New York.

Moser, S. C. (2010). Communicating climate change: History, challenges, process and future directions. *WIREs Climate Change*, *1*, 31–53. https://doi.org/10.1002/wcc.011

Moser, S. C., Daniels, C., Pike, C., & Huva, A. (2016). *Here-now-us: Visualizing Sea level rise and adaptation using the OWL technology in Marin County, California*. Susanne Moser Research and Consulting, Santa Cruz and Climate Access, San Francisco.

Nicholson-Cole, S. A. (2005). Representing climate change futures: A critique on the use of images for visual communication. *Computers, Environment, and Urban Systems*, *29*, 255–273. https://doi.org/10.1016/j.compenvurbsys.2004.05.002

Priestly, R. K., Heine, Z., & Milfont, T. C. (2021). Public understanding of climate change-related sea-level rise. *PLOS One, 16*(7), e0254348. https://doi.org/10.1371/journal.pone.0254348

Retchless, D. P. (2018). Understanding local sea level rise risk perceptions and the power of maps to change them: The effects of distance and doubt. *Environment and Behavior. 50*(5), 483–511. https://doi.org/10.1177/0013916517709043

Retchless, D., Mobley, W., Davlasheridze, M., Atoba, K., Ross, A. D., & Highfield, W. (2021). Mapping cross-scale economic impacts of storm surge events: Considerations for design and user testing, *Journal of Maps*, *17*(1), 123–135. https://doi.org/10.1080/17445647.2021.1940325

Richards, D. P. (2019). An ethic of constraint: Citizens, sea-level rise viewers, and the limits of agency. *Journal of Business and Technical Communication*, *33*(3), 292–337. https://doi.org/10.1177/1050651919834983

Richards, D. P., & Stephens, S. (2021a). SLR stories [home page]. https://tinyurl.com/SLRstories-videos

Richards, D. P., & Stephens, S. (2021b). SLR stories [home page]. https://tinyurl.com/SLRstories-quotes

Sackey, D. J. (2020). One-size-fits-none: A heuristic for proactive value sensitive environmental design. *Technical Communication Quarterly*, *29*(1), 33–48. https://doi.org/10.1080/10572252.2019.1634767

Schneider, B., & Walsh, L. (2019). The politics of Zoom: Problems with downscaling climate visualizations. *Geography and Environment*, *6*(1), e00070. https://doi.org/10.1002/geo2.70

Shivers-McNair, A., & San Diego, C. (2017). Localizing communities, goals, communication, and inclusion: A collaborative approach. *Technical Communication*, *64*(2), 97–112.

Stephens, S. H., DeLorme, D. E., & Hagen, S. C. (2014). An analysis of the narrative-building features of interactive sea level rise viewers. *Science Communication*, *36*(6), 675–705. https://doi.org/10.1177/1075547014550371

Stephens, S. H., DeLorme, D. E., & Hagen, S. C. (2015). Evaluating the utility and communicative effectiveness of an interactive sea-level rise view through stakeholder engagement. *Journal of Business & Technical Communication, 29*(3), 314–343. https://doi.org/10.1177/1050651915573963

Stephens, S. H., & Richards, D. P. (2020). Story mapping and sea level rise: Listening to global risks at street level. *Communication Design Quarterly, 8*(1), 5–18. https://doi.org/10.1145/3375134.3375135

Sun, H. (2006) The triumph of users: Achieving cultural usability goals with user localization. *Technical Communication Quarterly, 15*(4), 457–481. https://doi.org/10.1207/s15427625tcq1504_3

Sweet, W. V., Hamlington, B. D., Kopp, R. E., Weaver, C. P., Barnard, P. L., Bekaert, D., Brooks, W., Craghan, M., Dusek, G., Frederikse, T., Garner, G., Genz, A. S., Krasting, J. P., Larour, E., Marcy D., Marra, J. J., Obeysekera, J., Osler, M., Pendleton, M., … Zuzak, C. (2022) *Global and regional sea level rise scenarios for the United States: Updated mean projections and extreme water level probabilities along US coastlines.* (NOAA Technical Report NOS 01.) National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, pp. 111. https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nos- techrpt01-global-regional-SLR-scenarios-US.pdf

ABOUT THE AUTHORS

Dr. Daniel P. Richards is an associate professor of English at Old Dominion University. His research has covered a variety of areas, including the politics of higher education, disaster and risk communication, and the intersections of posthuman and new materialist theory in the field of rhetoric. Most recently, his work focuses on the empirical study of visual risk communication, particularly through the lens of community engagement, to best understand how to communicate sea level rise and flooding to coastal communities. Dr. Richards can be reached at dprichar@odu.edu.

Dr. Sonia H. Stephens is an associate professor of technical communication in the Department of English at the University of Central Florida. She studies ways to convey scientific and technical information to different audiences using visual and interactive media. Her current research focuses on the user-centered development of products designed to communicate about natural hazards-related risk and mitigation information with coastal residents. Dr. Stephens can be reached at sonia.stephens@ucf.edu.

Localizing UX Advocacy and Accountability: Using Personas to Amplify User Agency

doi: https://doi.org/10.55177/tc914783

By Guiseppe Getto and Suzan Flanagan

ABSTRACT

Purpose: This article documents ongoing UX research to develop a grant-funded mobile safety app for recreational boaters. The article presents a workflow for designers to align user advocacy with organizational accountability through the use of personas. Each year, numerous boating safety concerns and incidents go unreported. User research into this context shows that recreational boaters want a mobile app that helps them enjoy boating trips while remaining safe.

Method: We reviewed best practices from literature, analyzed interviews with 141 stakeholders, and then discussed findings using personas to amplify user agency as part of a Lean UX workflow for the development of a mobile app that balances users' goals with organizational accountability.

Results: Representative groups of boaters want features that help them with navigation, charting, and communication. These features would help alleviate pain points and enable goals having to do with not getting lost, avoiding hazards, and communicating trip progress to audiences onshore. In addition, the personas we have developed will help us communicate to the development team behind the app to explain how they can develop features that accommodate users' needs.

Conclusion: Though personas are limited as to how well they represent actual users, if used properly within a design process they are a powerful tool for amplifying user agency so that resulting apps achieve user adoption. As part of a Lean UX workflow, personas are a useful tool in tailoring products and services to user needs while ensuring organizational accountability to those needs.

KEYWORDS: User experience (UX), Persona, User advocacy, Agency, Research method

Practitioner's Takeaway

- Successful design processes must align business goals with user goals to achieve organizational sustainability and user adoption. Design processes must consider the goals and pain points of actual users.
- UX researchers and others interested in user advocacy can use personas to amplify the impact that users have on design processes by providing developers with a means to understand user needs and to translate these needs into features.
- Though personas are limited as far as representing actual users, if used properly within a design process, they are a powerful tool for ensuring that resulting apps achieve user adoption. (We call this *organizational accountability*.)

Localizing UX Advocacy

INTRODUCTION

UX design has become an established sub-field within technical communication (TC), with researchers and practitioners doing everything from usability testing to developing working prototypes of apps. At the same time, both researchers and practitioners have documented a wealth of best practices for engaging in design processes that centralize users. As these practices are continually evolving as new technologies are developed, however, new practices must always be documented as design situations change. Newer technologies such as mobile apps have ushered in new challenges.

In this context, this article documents ongoing UX research to develop a grant-funded mobile safety app for recreational boaters. The article details a workflow for aligning user advocacy with organizational accountability through the use of personas. Each year, numerous boating safety concerns and incidents go unreported. User research into this context shows that recreational boaters want a mobile app that will help them enjoy boating trips while remaining safe. In order to represent the needs of recreational boaters for the developers of this mobile app, we developed a practice we call *using personas to amplify user agency.*

By using personas to amplify user agency, we delve into a problem that has plagued UX research since its inception: how best to incorporate user feedback into a design process. This problem has been answered many times, but no universal best practice exists. At the center of this problem is the underlying question of how much agency users should have in a design process. Though user advocacy is an important catchphrase in modern UX discourse, the question of how best to advocate for users is also still an open one. Thus, our process of using personas to amplify user agency springs from the following research questions:

1. What pain points,[1] goals, and key characteristics best differentiate user groups within interview data collected on recreational boaters?
2. What personas, or archetypal users, best represent these user groups?
3. At a broader level: how can personas best be used to amplify user agency within a design process?

To answer these questions, we discuss user interviews with recreational boaters from across the US: to identify pain points, goals, and key characteristics amongst this group of stakeholders and to differentiate user groups into personas. These personas will be used to define requirements that the development team behind the SeaMe mobile app can meet through the development of specific features.

Currently, recreational boating accounts for a significant percentage of recreation-related accidents, property damage, and fatalities. The U.S. Coast Guard's report in 2019 documented 4,168 accidents that involved 2,559 injuries; approximately $55 million of property damage; and 613 fatalities that resulted from recreational boating accidents (American Boating Association, n.d.). According to industry insiders, U.S. boating regulations have not been adequately updated since the 1970s because of successful lobbying by boating manufacturers (Anonymous, personal communication, February 2021).[2] From interviews for our research, we were also informed that recreational boating administrators exceed their state budgets for boating safety, meaning that additional funding is not available to increase programming that would decrease incidents.

While interviewing to gather data for our research, the first author was enlisted to serve as entrepreneurial lead on an NSF I-Corps grant. In this role, he conducted interviews with potential users of a free mobile app that, if developed, might improve boater safety. The nascent business model of this app involves an exchange of a free mobile app for user data. In interviewing, he learned that government regulators who oversee recreational boating safety, including state representatives known as Boating Law Administrators (BLAs), spend large portions of their annual budgets on costly search-and-rescue (SAR) operations to track boaters who have become lost—a problem that a new

1 Pain points are a term of art used by modern UX designers to indicate a point during which users get frustrated, fatigued, inconvenienced, or otherwise have an aversive experience when navigating an app. The term is also sometimes applied to daily struggles they may experience that an app could solve, such as not being able to detect underwater hazards until their boat runs aground.

2 Though a systematic review of governmental regulations was beyond the scope of this research study, this claim was supported by most of the BLAs whom we interviewed, in addition to several members of the federal government charged with administering recreational boating regulations.

app would help solve. Recreational boaters, on the other hand, want an app that helps them boat safely. The result is the SeaMe mobile app, which delivers anonymized data on boater positions to emergency responders to help them more efficiently find lost boaters. SeaMe also provides boaters a free, full-featured safety app that runs on a mobile phone (Figure 1).

The BLAs whom we interviewed are using data from past incidents to help plan for new incidents. No consistent, real-time data are currently available on recreational boating. In addition, first responders typically learn of lost boaters from a friend or family member who reports them missing, and BLAs must calculate the cost of human life based on how much they can afford to spend on each SAR incident. At the same time, recreational boaters who have smaller boats (less than 24 ft) typically lack access to advanced safety warning systems that come standard on large vessels, such as GPS-based systems that track boating traffic and underwater hazards. Thus, an opportunity exists to provide free safety features in an accessible form to recreational boaters while alleviating a major pain point of BLAs.

SeaMe, a seemingly simple solution, has required extensive research and development but is not yet ready to be deployed. The process leading to this business model has involved Lean UX research and user advocacy that other researchers and practitioners can apply to their own work. In this article, we share our review of best practices from mobile UX literature and our analyses of 141 user interviews, and then we discuss using personas to amplify user agency as part of a Lean UX workflow to develop a mobile app, a process that balances user goals with what we call *organizational accountability*.

Below, we discuss literature that enabled us to utilize user advocacy and persona development as well as how our own approach compares. In a previous manuscript, we reported the pain points of BLAs (Getto et al., 2021); in the present article, we focus on the pain points articulated by recreational boaters. We then discuss our research methodology, using personas to amplify user agency, and we contextualize this methodology within our overall Lean UX workflow. From here, we present our finalized personas and discuss how they impact the design process going forward. We close with limitations to our approach that we discovered, and we recommend future research.

LITERATURE REVIEW

In reviewing literature for best practices, we considered work on mobile apps, Lean UX, user advocacy, and TC as well as integrating our past research into the foundation for this study.

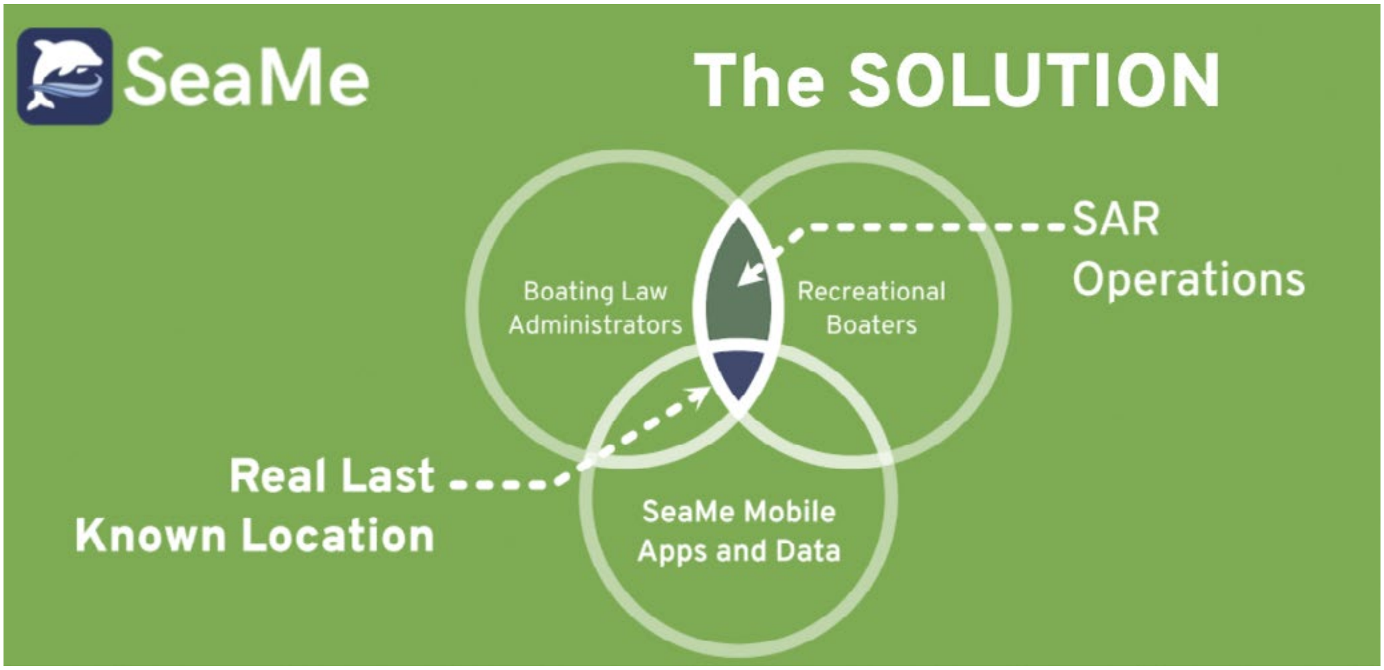


Figure 1. SeaMe app business model

Mobile Apps, Lean UX, and User Advocacy

The central term for the work in which UX designers engage is the UX design process—defined as the sum of activities that need to occur to ensure a high-quality user experience (Buley, 2013; Garrett, 2003; Hartson & Pyla, 2012; Hoober, 2017; Interaction Design Foundation, n.d.). This process is typically depicted as a series of stages that a UX designer (or more often, a group of designers) goes through to produce a digital product or service for a specific group of users. Digital apps are expanding at an exponential rate, so UX designers are often responsible for building products and services as diverse as enterprise software for large companies, learning management systems for institutions of higher education, mobile apps for startups, and public-facing websites for organizations. If the app is being produced according to current best practices, which is not always the case, then designers will gather information from users at several stages of the design process to ensure the app meets user needs.

The stages of the UX design process vary from practitioner to practitioner but typically involve the following steps (Buley, 2013; Garrett, 2003; Hartson & Pyla, 2012; Hoober, 2017; Interaction Design Foundation, n.d.):

1. Preliminary research involves gathering user information and defining requirements.
2. Prototyping is developing a working simulation of the final product or service.
3. Usability testing a prototype encompasses assessing the prototype for usability with actual users.
4. Maintenance has designers launching the product or service and maintaining its user experience over time on an as-needed basis.

Essentially, design projects start with user interviews, preferably in the context in which users will use the app. These interviews might be followed up with observational sessions with users during which UX researchers note common work practices, technology usage, and other elements of the users' context. From this contextual data, a rough prototype of the app is developed. In the past, this process commonly starts with a paper prototype—sometimes still the case, according to our anecdotal interactions with practitioners—but often proceeds to a low-fidelity, clickable prototype that can be used in usability testing. This prototype is then refined through succeeding rounds of usability testing until it reaches high fidelity and finally is launched as a product or service. Maintenance of the product or service often entails updates, design tweaks, and content strategy for the product, with the design process beginning again in earnest when an exigence for major changes arises, such as changes to web standards or organizational goals.

Technical Communication and UX

Although many researchers have explored the UX process within TC literature (e.g., Albers, 2003, 2004; Andrews et al., 2012; Getto & Moore, 2017; Potts, 2009, 2013; Shivers-McNair et al., 2018; Spinuzzi, 2005; St.Amant, 2018; Sun, 2013), we found that few specifically investigated mobile UX (Getto et al., 2020; Hennes et al., 2016; Verhulsdonck, 2017) or Lean UX (Batova, 2020; Getto et al., 2016, 2021). Additionally, when looking for dedicated workflows for designing mobile apps (from start to finish of an app's design), next to none were available within TC research.

This work is too diverse to sum up in a paragraph, but highlights include:

- UX and TC feed into one another academically and professionally, based on the paths graduates of TC programs tend to follow (Getto et al., 2013, 2016; Getto & Beecher, 2016).
- These developments require TC to develop new research methods, pedagogies, and best practices that enable us to research, teach, and do UX within our workplaces (Albers, 2003, 2004; Andrews et al., 2012; Getto & Moore, 2017; Potts, 2009, 2013; Shivers-McNair et al., 2018; Spinuzzi, 2005; St.Amant, 2018; Sun, 2013).
- These research methods, pedagogies, and best practices are distinct from those in other disciplines (i.e., computer science or IT) and show that the disciplinary foci of technical communication are influencing the way we think about UX.

In other words, the UX process involves several forms of communication (e.g., usability testing, cross-functional teamwork, communication of complex topics to non-specialist audiences) that are of interest to technical communicators, and thus a productive influence exists between the two disciplines and the fields will not be disentangled any time soon. Furthermore, this continued interplay may result in technical communication becoming one of the main disciplinary homes for UX.

Lean UX and How Our Approach Differs

Our approach to Lean UX (documented in Getto et al., 2021) differs somewhat from Gothelf and Seiden (2013), who define Lean UX process as consisting of the following stages: concept, prototype, validate internally, test externally, learn from user behavior, and iterate. From Lean UX, we primarily pull this emphasis on iteration. Iteration is especially important in a mobile context because more users and types of users exist than ever before and are using apps in new ways that were not envisioned by designers. From our past literature review in this area, our working definition of mobile UX is "the processes and components of a mobile app and its users that influence, and are influenced by, individual, technological, and social factors" (Getto et al., 2020, p. 116). Combining Lean UX and our research into mobile UX best practices, we developed the following approach near the beginning of the current research project (directly quoted from Getto et al., 2021):

1. Discover: Mobile UX must start with a deep dive into the core goals and pain points of real, live users.
2. Advocate: Organizational goals must then be balanced with user goals so that the two become aligned.
3. Account: Specific design goals must be developed that ensure organizational accountability to user goals.
4. Prototype: Because mobile experiences are all so different and are focused on select groups of users, early prototypes help align user goals and pain points with affordances.
5. Test: These affordances should then be tested as prospective features by providing a series of simple actions that test users can take via the prototype app.
6. Refine: This entire process must be iterated until the application is a valid expression of user goals and organizational accountability systems. (p. 119)

This is our overall approach to the UX process (which we detail thoroughly in Getto et al., 2021). In the current article, we wish to explore one aspect of this process: the use of personas to amplify user agency, which largely happens at the discover, advocate, and account stages. Below we explore past literature on persona development in-depth.

Persona Development and What It Means for User Agency

Regardless of the specific context and workflows used in a UX process, the process itself largely still involves the steps articulated above: preliminary research, prototyping, usability testing of a prototype, and maintenance. As anyone who has actually enacted this process can attest, however, what may seem like a linear process on paper is often anything but straightforward. Organizational goals surrounding a given app can shift and change. Target users for the app sometimes shift, either because changes to organizational goals require it or because initial testing reveals the app is not appropriate for its original target user community. Exigences such as these mean that UX researchers "cannot consistently predict what kinds of information might be important to specific groups and in specific situations; we need methods by which we can understand the dynamic relationships between users and technologies" (Potts, 2009, p. 285). In other words, as digital products and services become increasingly pervasive and complex, the relationships among users, apps, and contexts of use become increasingly complex and unpredictable. Despite this increase in the pervasiveness, complexity, and unpredictability of use cases for digital apps, or perhaps because of it, "most users are involved in the design process too late to influence the final product" (Andrews et al., 2012, p. 124). This failure to account for users and their contexts "explains systems which function technically but fail because of lack of user acceptance" (Albers, 2003, p. 270).

As a result, mobile and Lean UX literature tends to focus on how researchers and practitioners gather feedback from target users and bridge the gap between user goals and organizational goals. Revisiting our definition of mobile UX, we can consider to "individual factors" and "social factors" that surround the design of any mobile app, and we can consider how to advocate further for target user groups from an organizational standpoint. The most influential research that investigates user advocacy in TC builds from the concept of researchers working closely with a community of users to identify core values and needs rooted within existing social relationships and processes (Grabill, 2007; Hennes et al., 2016; Potts, 2013; Sun, 2013). This deep interaction is a heuristic in itself; working with users to understand their needs and

expectations should change a designer's perspective and the organizational goals behind the app.

Building an app around existing user relationships, values, and needs is no simple task. On one end of the spectrum of methods, participatory design (Spinuzzi, 2005) incites UX researchers to involve users in actual design processes. On the other end of this spectrum are more traditional methods, like contextual inquiry (Potts & Bartocci, 2009), usability testing (Nielsen, 2012), and persona development (Getto & St.Amant, 2014). The difference is in whether users are continually or repeatedly involved in a design process or are involved only at specific moments. In a UX design process that is not explicitly based in participatory design, users are typically involved at the beginning, through contextual inquiry into their contexts of use, and when usability testing a prototype. Our goal is not to advocate for or against participatory design but to point out that in many situations it is not practical, such as when users do not have time or interest to join lengthy design processes. Such is the case in our own design process where we are attempting to develop a mobile user experience for a host of different user groups, many who are geographically dispersed. It would be very costly and time-consuming to organize those users into review groups to look at each prototype of our design.

In this way, we are where many UX researchers find themselves: project constraints leave us with distinct moments of interaction with actual users. In this case, researchers must attempt to represent how users probably will react to a design, based on careful analysis of empirical observations and interviews with real users. UX researchers take on a balancing act to differentiate users into groups so that various users' mental models, or expectations for how a design will function, are respected. As Albers (2009) describes this process:

> [Because] each user is different, user analysis which aims to construct only one representation runs a high risk of being minimally applicable to a substantial number of users. . . . Instead, the design can be based on a more general understanding of the structures of effective mental model processes which are used. An end goal of the user analysis is to define structural descriptions of possible and effective mental models. (p. 184)

The goal of delving into user contexts is to define the ways different users will react to a design, based on their mental models.

One common way that UX designers represent user reactions in this way is by developing personas or archetypal users. Persona development is a process by which UX designers seek to represent key trends in user research through crafting archetypal users that represent these trends:

> A persona is a way to model, summarize and communicate research about people who have been observed or researched in some way. A persona is depicted as a specific person but is not a real individual; rather, it is synthesized from observations of many people. Each persona represents a significant portion of people in the real world and enables the designer to focus on a manageable and memorable cast of characters, instead of focusing on thousands of individuals. Personas aid designers to create different designs for different kinds of people and to design for a specific somebody, rather than a generic everybody. (Goltz, 2014)

Personas help UX researchers represent the distinct user groups of an app as a "manageable and memorable cast of characters" (Goltz, 2014) with distinct mental models, rather than a list of user requirements, numbers, and statistics.

In our own context, our perspective on our design was altered as we talked to boaters who might serve as users for a mobile app and to BLAs who might use the app to find lost boaters and also to keep boaters safe. Users, technologies, and organizational stakeholders—in this case, boaters, BLAs, organizations, and other groups—do not exist in a vacuum but are co-determiners of a design situation. All stakeholders and their needs and expectations need to be balanced to create a successful product. Stakeholders are intertwined: user advocacy will fail if organizational goals are not considered, and organizations will fail to achieve their goals if users' goals are not met.

In the method section, we explore this balancing act further by diving into the actual research project that gave birth to this workflow. Our unit of study (Merriam, 1998, p. 27; Stake, 2000, p. 436) during the analysis of a potential user base for a mobile boating safety app was the personas representing different recreational boater users we interviewed.

METHOD: USING PERSONAS TO AMPLIFY USER AGENCY

By using personas to amplify user agency, we are thus responding to several challenges (i.e., research gaps) currently present in UX design literature:

- The question of how, and when, to involve users in a design process
- The question of how to represent users when making design decisions
- The question of how to balance user goals and organizational goals.

As we detailed above in our literature review, there are several answers to these questions, but as we mentioned in our introduction, design situations are constantly evolving. Less an entirely novel approach, then, our approach to using personas to amplify user agency is a response to several exigences from our design situation.

These exigencies include:

- Users (i.e., recreational boaters) that are scattered all over the country and difficult to reach for interactions like interviews outside of personal networks
- A large body of users with a large variety of goals and pain points
- A developing business organization behind the SeaMe app with developing goals that we are attempting to sync with user goals
- An overall mission to help intervene in a pressing social need for better recreational boating safety technology.

Our approach to using personas to amplify user agency is thus a response to these specific challenges but at the same time a response to an ongoing conversation in UX. It is certainly not a definitive approach, but we feel that it might also be of use to other researchers and practitioners in other design situations. To give context on how specifically applied the approach in our own situation, below we detail our data collection, data analysis, and findings.

Data Collection

The first author of this article was initially recruited to serve as a UX researcher on an IRB-approved study to evaluate the viability of a mobile app for recreational boaters. That initial project would expand into a multi-year one which included an NSF I-Corps grant to study the viability of such an app for users. For the purposes of the current article, between January 21 and March 5, 2021, 117 recreational boaters and 24 BLAs from across the US were recruited and interviewed. Recruitment was mostly initiated through the personal network of one of the mobile app developers, who had extensive experience in recreational boating and many recreational boating contacts. He developed a list of boaters and BLAs across the US who were contacted through email or phone for recruiting them to the project. For the purposes of this article, we focus on the data we collected on recreational boaters, having detailed our analysis of data on BLAs in Getto et al. (2021).

Interviews with recreational boaters were conducted using the interview questions outlined in Figure 2. Boaters were interviewed in a semi-structured format in person, via phone, or over video conference, depending on the participants' technological aptitude and availability. After we recruited initial participants from our personal networks, we used a snowball methodology to recruit other participants.

- How long have you been boating?
- How do you communicate with people onshore while you are boating?
- What are challenges when you're trying to communicate with people onshore?
- How do you deal with those challenges?
- How do you deal with conditions on the water (i.e., weather, hazards, other boaters, etc.)?
- What are challenges you experience with conditions on the water (i.e., weather, hazards, other boaters, etc.)?
- How do you deal with those challenges?
- Is there anything I missed?
- Do you know 2–3 more people we could talk to?

Figure 2. Interview questions for recreational boaters

We should also note that attempts to recruit participants outside of personal networks failed. At one point, for instance, we advertised the study via an email listserv to approximately 27,000 individuals and received zero responses. Members of the SeaMe app development team explained this problem as one of insularity: recreational boaters are most likely to talk to someone else interested in recreational boating. We were thus much more successful utilizing a snowball approach.

Data Analysis

The transcribed recreational boater interviews were entered into NVivo 12 Plus and, using grounded theory, coded to identify the participants' pain points (see Getto et al., 2021 for details on coding). In the initial analysis, demographic data (e.g., age, gender, boat size) and several behavioral characteristics (i.e., involvement in a boating accident, use of float plans, and use of mobile apps for boating purposes) were entered as case attributes. However, additional data points and analyses were needed to identify and develop representative personas. More details were extracted from the interviews and entered as supplementary case attributes (e.g., boating location, boat type, safety certification).

All case attributes were then exported to Excel because some analyses were difficult to perform or to visualize in NVivo when the number of participants exceeded 50; this study involved more than 100 participants. The participant data could easily be sorted and filtered by case attributes in Excel.

We created the personas using a method similar to Quesenbery's (2003) approach (i.e., identifying similarities in personal characteristics, tasks, and stories). Based on what we learned from the qualitative coding of participants' problems (Getto et al., 2021), we looked for data convergence points. We hypothesized that the data would break along lines of problems related to boating types (i.e., powerboats, sailboats, or paddlecraft); locations (i.e., inland or coastal); or activities (e.g., fishing, hunting, sailing, paddling, cruising). We also looked for patterns in the data associated with boating experience, gender, or age. Participants were excluded from this analysis if their ages were unknown or if they did not use apps for boating.

The mode was determined for each case attribute. Intersections of these modes were used to identify the personas. Next, we ran a cluster analysis in NVivo to confirm that the groups of potential personas were indeed distinct from one another (Qualtrics, 2022). The cluster analysis evaluated the similarity between attribute values. We then looked for one representative participant in each cluster to serve as the inspiration for the persona (Quesenbery, 2003).

In theory, we could have started with the cluster analysis and selected a participant from each of the 10 clusters within the dendrogram; however, in practice, the Jaccard's coefficient, which measures the degree of similarity between attributes, cannot alone reveal the distinct differences between participants nor can it accurately represent the participants' stories (Whorton, 2021). Our mixed-analysis approach enabled us to identify five personas that would best inform the design of a mobile boating app.

FINDINGS

Findings are organized per the three research questions that this project addressed.

Research Question 1: What pain points, goals, and key characteristics best differentiate user groups within interview data collected on recreational boaters?

Pain points among recreation boaters emerged under a variety of themes (Getto et al., 2021), which included:

- Communication: e.g., the ability to communicate with people on shore, with other boaters, and with emergency responders
- Facilities: e.g., the location of marinas, boat ramps, and other amenities
- Hazards (other than other boaters): e.g., reefs, sandbars, and narrow channels
- Navigation and location concerns: e.g., the ability to track progress on a trip, the ability to navigate to a specific point, and the ability to backtrack if lost
- Other boaters: e.g., the ability to track the location of other boaters, the ability to avoid unsafe boaters, and the ability to be warned of oncoming vessels
- Safety concerns: e.g., the ability to check off required safety provisions, the ability to receive warnings regarding unsafe conditions, and the ability to be informed as to local laws and regulations
- Technology: e.g., the ability to maintain a consistent connection to GPS, the ability to use their mobile device on the water, and the ability to connect with other boaters while on the water.

As seen in Figure 3, users expressed various concerns related to recreational boating; their concerns ranged from communicating with other parties, including their family and friends who are ashore to dealing with other boaters.

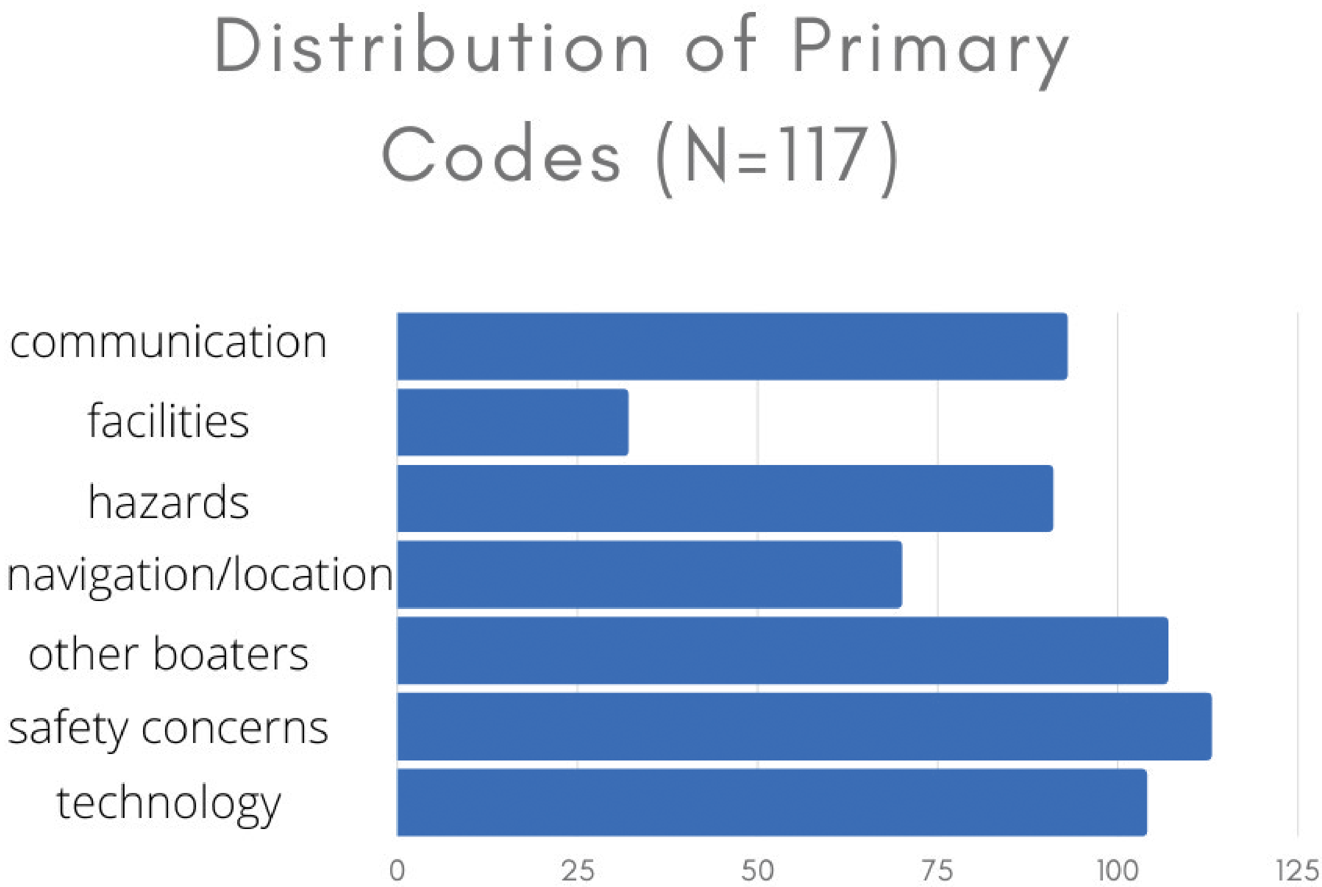


Figure 3. Themes regarding user pain points

These interviews revealed that the design of this relatively simple mobile app was anything but simple. Rather, this situation contains a wide variety of pain points for recreational boaters that many different users across that group prioritize in their interviews. In this case, designing an app to meet all these needs is not possible, especially not in a mobile interface, given the strict need for simplicity and usability articulated above. Rather, crafting these data into personas, archetypal users who can serve as “a manageable and memorable cast of characters” (Goltz, 2014), has become an essential step in our design process. This step ensures that as the app is prototyped (a process the development team behind the app is currently engaged in), we can bring this prototype in line with the needs of distinct groups of users. This process for prototyping will help us with balancing user advocacy and organizational accountability, which are the hallmark of our workflow.

Research Question 2: What personas, or archetypal users, best represent these user groups?

From our data analysis, we derived five personas: Roger, a fish and game enthusiast (Figure 4); Ellen, a lady at the helm (Figure 5); Isaac, a weekend warrior (Figure 6); Cameron, a paddlecrafter (Figure 7); and Roberto, a sea dog (Figure 8). The personas range in age from early 30s to mid-60s and have 5–35 years of boating experience.

(All names on personas are pseudonyms used to protect participant identities. All images are royalty-free stock images. For further details on the elements common to personas, see Getto and St.Amant, 2014.)

Localizing UX Advocacy

Figure 4. The Roger Persona

Figure 5. The Ellen Persona

Figure 6. The Isaac Persona

Figure 7. The Cameron Persona

Figure 8. The Roberto Persona

Most of the personas operate 20- to 30-ft powerboats. At the extremes are Cameron, a paddlecrafter who owns a boat less than 20 ft, and Roberto, a sea dog with a 39-ft sailboat. Cameron operates his boat exclusively in inland waters, and the others navigate in both inland and coastal waters. Their recreation makes sense in the context of recreational boaters, as many powerboats larger than these include reliable GPS systems that would replace the need for a mobile app. Sailboats vary as to what technology they include.

Gender differentiates one persona from the others. Approximately 20% of the study participants are female, and that proportion is reflected by the one female persona (Figure 5), though not intentionally (merely how the data aligned.) Ellen, a lady at the helm, represents those female voices that, according to one participant, are underrepresented in boating.

A primary difference that distinguishes the personas is how they boat (e.g., sailing versus paddling). Although all boaters share similar safety concerns (e.g., drowning, underwater hazards, weather), some concerns are specific to the type of boat used. For example, people who sail are largely reliant on winds, whereas those who kayak rely on muscle power and paddles to propel their crafts. Those in sailboats and paddlecraft face more difficulties to quickly navigate out of the path of an oncoming vessel or to avoid floating debris, whereas the limiting factor for those in powerboats is fuel and mechanical performance.

Another difference between personas is their purpose for boating (e.g., hunting, socializing, exploring, basking). Although these activities are not mutually exclusive or, for that matter, limited to any one boater, the main purpose of the boating excursion often corresponds to potential marine perils or communication challenges. For instance, a boater whose objective is either fishing or hunting tends to follow the fish or game, and might find themselves in unfamiliar waters or become hyper focused on their task and lose awareness of their surroundings.

Each persona speaks to a different concern or problem. Roger, a fish and game enthusiast, struggles to maintain contact with his buddy boaters (see Figure 4). Ellen, a lady at the helm, does not want to be tracked unless she is on the water (see Figure 5). Isaac, a weekend warrior, needs an easier way to coordinate meetups with other boaters (see Figure 6). Cameron, a paddlecrafter, needs a reliable method for backtracking his route (see Figure 7). Roberto, a sea dog, wants an automated, carefree method for tracking his location as he sails to impromptu locations (see Figure 8).

Research Question 3: At a broader level—how can personas best be used to amplify user agency within a design process?

Once personas are developed, the question becomes, "how will personas be mobilized to improve the design of our prototype mobile app?" This is a complex question that deserves its own article, but simply put, personas are used by UX researchers to align the design of apps with user needs. For example, the various pain points we uncovered in our interview data at a broad level (Figure 3) are difficult exigencies for designers. UX researchers and designers must ask questions, including what requirements they should include in an app if users express safety concerns, issues with technology, or concerns with the behavior of other boaters. These broad trends are important to keep in mind but are not strong heuristics for guiding the design of an app.

Personas, however, help UX researchers "design for a specific somebody, rather than a generic everybody" (Goltz, 2014). The key is that personas *must be representative of broader trends in user data.* Otherwise, the specific boater for whom a design is created will not align with the group of users the persona represents. In this way, personas become a key representation of user agency and organizational accountability. UX researchers can imagine the kinds of requirements that Roger, Ellen, Isaac, Cameron, and Roberto have for a mobile app. They can envision the flows that users like these would take through an app's features. Most importantly, the researchers can easily recruit users like these personas for usability testing once features are developed.

Moreso, UX researchers can imagine what these users can provide to the business organization behind the SeaMe app. According to that organization, its current business model involves the exchange of a free mobile app for user data. Organizational accountability in our current project means providing a fully featured mobile safety app to boaters in exchange for anonymized data that will help first responders find lost boaters faster. The organization is accountable to its users if it provides features that its users want, in this case, for free. This accountability must be balanced with providing something that furthers organizational goals—in this case the leveraging of anonymized user data to improve SAR operations for BLAs who are willing to pay for the use of this data.

Personas help UX researchers design app features that meet the needs of specific groups of users, help guide the crafting of user flows that would fit within users' actual lives—that is, beyond the rich, micro-level details that make a group of users unique (beyond Figure 2). For example, in this case, each group of users is already using various technologies when they are boating, but for the UX researcher, it is more important to understand why they are using these technologies, what specific pain points they are trying to solve in their daily lives, and what goals users are trying to achieve.

An important goal, not only for these users but also for the incipient business organization behind the SeaMe app, is safety. One of the primary mechanisms that first responders use to locate a lost boater is a "float plan." Similar to a flight plan that is filed before flying a plane, a float plan notifies authorities where a boater plans to go and what general route the boater plans to take. The float plan is a form of official government documentation that guides first responders in the case of an emergency (U.S. Department of Homeland Security, 2016). However, as readers may note, none of the user groups in the personas regularly file this documentation. Therefore, first responders are left to call emergency contacts on fishing licenses and other forms of documentation. Based on reports of boating administrators, most of the time, they are not aware that a boater is missing until a friend or family member reports concern.

At the same time, our personas do communicate informal float plans to friends and family. Thus, a feature that might be successful in our incipient app is a float plan that informs both groups: boater friends and family and first responders. Another innovation would be regular updates to the float plan so that as plans change audiences know when boaters deviate from their original plans. These features, which are not currently

available in other apps, could potentially save boating administrators millions of dollars by decreasing the number of wide area searches they currently complete for lost boaters.

To effectively advocate for users, UX researchers need to pay attention to their specific goals and pain points. As mentioned above, an app that meets business goals but fails to meet user goals risks failing to attract users. In our project, it is unclear if a mobile app that only provided a float-plan feature would attract a significant user base, especially considering the goals and pain points of specific personas; none of the personas mentioned filing a float plan as a specific goal or pain point. Instead, their goals and pain points aligned at the intersection of navigation, charting, and communication. The personas' responses indicate that our mobile app needs to provide features that enable these goals and alleviate these pain points if we expect users to adopt the app.

Data were not collected on how often user goals conflict or do not align with business goals, but our anecdotal experience as UX researchers and verbal reports of best practices from practitioners in this space indicate that misalignment is common.[3] We have witnessed apps that were launched with the best of intentions but failed to attract a user base because the apps did not attend to specific user needs and pain points. In this way, personas stand to significantly amplify user agency in a variety of design situations in which participatory design is not feasible. Personas can act as actors within design networks in which UX researchers work with app developers to develop technologies that are truly useful to users. However, personas can act within design networks only if those networks are developed and used within the specific networks of people and technologies that produce apps.

CONCLUSION: PERSONAS CAN ONLY AMPLIFY USER AGENCY IF APPLIED PROPERLY

One limitation of our current analysis, and a limitation of personas in general, is that they seek to represent actual people. In treating personas as actors within design networks, UX researchers move actual design decisions one remove from actual users. However, in many circumstances, a more participatory approach is not feasible. First, participatory design is not immune to issues of representation; UX researchers cannot run every design decision by every intended user unless the app in development is only going to be used by a small group. In the case of the SeaMe app, in the US, approximately 12 million potential users have registered boats and approximately 100 million recreational boaters are potential users (Statistics, 2021; General NMMA News, 2019). UX researchers could not vet each design decision with that many users.

As a result, participatory designers typically select representative users to participate in design activities, so they are also dealing with issues of representation (Elizarova & Dowd, 2017). In selecting representatives, our response is to tie personas to actual trends in user data. Like representative users recruited for a participatory design review, personas should be representative of actual groups of users, meaning users with similar demographics, goals, and pain points. Representation in personas does not guarantee that the resulting app will better represent users, but it makes accuracy more likely.

Another limitation of our findings is that personas can be improperly applied within design networks, such as when the utility of personas are not communicated adequately to the developers who are working on an app (Salazar, 2018). In this case, developers may fall back on technical requirements and end up with an app that does not appeal to specific users. This limitation, in our experience, can be mitigated only through the active efforts of a UX researcher who engages in a design situation. UX researchers must see an app development process through to its conclusion. Researchers no longer simply deliver their findings and walk away from the design process. Instead, UX researchers must guide this process from start to finish so that it aligns with the needs of users.

Regardless of these limitations, we are confident of these findings; our sample size was large enough to produce reliable results and the saturation of codes from interviews with participants were consistent. In future research and development, we will enter the Prototype, Test, and Refine loop common to Lean UX;

3 All the UX research we have personally reviewed has been from the viewpoint of documenting user goals and pain points and how to align the design of an app with these. There have been no studies, to our knowledge, that measure the alignment of organizational goals with user goals. Anecdotally, however, we have spoken to several dozen UX practitioners who have reported that this is a common issue.

in this loop, we develop and test actual app designs with users that match our initial interviews and continue to consider our personas. This loop will continue to inform us about how to balance advocacy and accountability within the context of increasing safety for recreational boaters. These personas have given us a target for this balancing point, which again centers around providing communication, wayfinding, and other safety features to users for free in exchange for anonymized data that that will assist first responders. Lessons learned during this next phase will also create additional findings for the TC community that we hope will be useful.

As for the findings of this article, we are certain of one thing: the personas we developed tell us more about the specific needs of users than any other deliverable we have created, including early prototypes that one of the authors helped to develop at the beginning of the project. These personas stand to provide a necessary method for amplifying the needs of actual recreational boaters so that the resulting app takes them fully into account. The lesson for other UX researchers and technical communicators interested in user advocacy is that personas can be a powerful tool for amplifying user agency by providing a means of communicating user goals and paint points in an understandable, persuasive manner.

ACKNOWLEDGMENTS

This work was partially supported by an NSF I Corps Grant.

REFERENCES

Albers, M. (2003). Multidimensional audience analysis for dynamic information. *Journal of Technical Writing and Communication*, *33*(3), 263–279. https://doi.org/10.2190/6KJN-95QV-JMD3-E5EE

Albers, M. (2004). *Communication of complex information: User goals and information needs for dynamic web information*. Routledge. https://doi.org/10.4324/9781410611543

Albers, M. (2009). Design for effective support of user intentions in information-rich interactions. *Journal of Technical Writing and Communication, 39*(2), 177–194.

American Boating Association. (n.d.). *Boating fatality facts*. https://americanboating.org/boating_fatality.asp

Andrews, C., Burleson, D., Dunks, K., Elmore, K., Lambert, C. S., Oppegaard, B., Pohland, E. E., Saad, D., Scharer, J. S., Wery, R. L., Wesley, M., & Zobel, G. (2012). A new method in user-centered design: Collaborative prototype design process (CPDP). *Journal of Technical Writing and Communication*, *42*(2), 123–142. https://doi.org/10.2190/TW.42.2.c

Batova, T. (2020). An approach for incorporating community-engaged learning in intensive online classes: Sustainability and lean user experience. *Technical Communication Quarterly, 30*(4), 410–422. https://doi.org/10.1080/10572252.2020.1860257

Buley, L. (2013). *The user experience team of one: A research and design survival guide*. Rosenfeld Media.

Elizarova, O., & Dowd, K. (2017, December 14). Participatory design in practice. *UX Magazine.* https://uxmag.com/articles/participatory-design-in-practice

Garrett, J. (2003). *The elements of user experience: User-centered design for the web*. New Riders.

General NMMA News. (2019, January 10). US recreational boating industry sees seventh consecutive year of growth in 2018, expects additional increase in 2019. *National Marine Manufacturers Association.* https://www.nmma.org/press/article/22428

Getto, G., & Beecher, F. (2016). Toward a model of UX education: Training UX designers within the academy. *IEEE Transactions on Professional Communication, 59*(2), 153–164. https://doi.org/10.1109/TPC.2016.2561139

Getto, G., Flanagan, S., & Labriola, J. (2021). Designing boater advocacy: A Lean UX mobile app project to increase emergency response accountability. *Proceedings of the 39th ACM International Conference on Design of Communication* (pp. 118–127). https://doi.org/10.1145/3472714.3473631

Getto, G., Labriola, J., & Flanagan, S. (2020). The state of mobile UX: Best practices from industry and academia. *2020 IEEE International Professional Communication Conference* (pp. 115–122). https://doi.org/10.1109/ProComm48883.2020.00024

Getto, G., & Moore, C. (2017). Mapping personas: Designing UX relationships for an online coastal atlas. *Computers and Composition*, *43*, 15–34. https://doi.org/10.1016/j.compcom.2016.11.008

Getto, G., Potts, L., Salvo, M., & Gossett, K. (2013). Teaching UX: Designing programs to train the next generation of UX experts. *Proceedings of the 31st ACM International Conference on Design of Communication* (pp. 65–70). https://doi.org/10.1145/2507065.2507082

Getto, G., & St.Amant, K. (2014). Designing globally, working locally: Using personas to develop online communication products for international users. *Communication Design Quarterly, 3*(1), 24–46. https://doi.org/10.1145/2721882.2721886

Getto, G., Thompson, R., & Saggi, K. (2016). Spurring UX innovation in academia through lean research and teaching. *2016 IEEE International Professional Communication Conference* (pp. 1–9). https://doi.org/10.1109/IPCC.2016.7740527

Goltz, S. (2014). A closer look at personas: What they are and how they work (part 1). *Smashing Magazine.* http://www.smashingmagazine.com/2014/08/06/a-closer-look-at-personas-part-1

Gothelf, J., & Seiden, J. (2013). *Lean UX: Applying lean principles to improve user experience*. O'Reilly Media.

Grabill, J. T. (2007). *Writing community change: Designing technologies for citizen action*. Hampton Press.

Hartson, R., & Pyla, P. (2012). *The UX book: Process and guidelines for ensuring a quality user experience*. Morgan Kaufmann.

Hennes, J., Wiley, K., & Anderson, B. (2016). The trail reporter mobile application: Methods for UX research and communication design as civic agency. *SIGDOC '16: Proceedings of the 34th ACM International Conference on the Design of Communication* (pp. 1–5). https://doi.org/10.1145/2987592.2987620

Hoober, S. (2017, March 6). Design for fingers, touch, and people, Part 1 [Web log]. *UXmatters*. https://www.uxmatters.com/mt/archives/2017/03/design-for-fingers-touch-and-people-part-1.php

Interaction Design Foundation. (n.d.). What is user experience (UX) design? *Interaction-Design.org.* https://www.interaction-design.org/literature/topics/ux-design

Merriam, S. (1998). *Qualitative research and case study applications in education*. Jossey-Bass.

Nielsen, J. (2012, January 3). Usability 101: Introduction to usability. *Nielsen Norman Group*. http://www.nngroup.com/articles/usability-101-introduction-to-usability

Potts, L. (2009). Using actor network theory to trace and improve multimodal communication design. *Technical Communication Quarterly*, *18*(3), 281–301. https://doi.org/10.1080/10572250902941812

Potts, L. (2013). *Social media in disaster response: How experience architects can design for participation*. Routledge. https://doi.org/10.4324/9780203366905

Potts, L., & Bartocci, G. (2009). <Methods> Experience Design </Methods>. *SIGDOC '09: Proceedings of the 27th ACM International Conference on Design of Communication* (pp. 17–21). https://doi.org/10.1145/1621995.1621999

Qualtrics. (2022). What is cluster analysis? When should you use it for your survey results? *Qualtrics XM Talks*. https://www.qualtrics.com/experience-management/research/cluster-analysis

Quesenbery, W. (2003). *Personas: Bringing users alive*. [PowerPoint presentation]. WQusability.com. https://www.wqusability.com/handouts/personas-overview.pdf

Salazar, K. (2018, January 28). Why personas fail [Web log]. *Nielsen Norman Group*. https://www.nngroup.com/articles/why-personas-fail

Shivers-McNair, A., Phillips, J., Campbell, A., Mai, H. H., Yan, A., Macy, J. F., Wenlock, J., Fry, S., & Guan, Y. (2018). User-centered design in and beyond the classroom: Toward an accountable practice. *Computers and Composition*, *49*, 36–47. http://doi.org/10.1016/j.compcom.2018.05.003

Spinuzzi, C. (2005). The methodology of participatory design. *Technical Communication*, *52*(2), 163–174.

St.Amant, K. (2018). Contextualizing cyber compositions for cultures: A usability-based approach to composing online for international audiences. *Computers and Composition*, *49*(2018), 82–93. https://doi.org/10.1016/j.compcom.2018.05.007

Stake, R. (2000). Case studies. In N. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 435–454). Sage Publications.

Statistics. (2021, January 6). US boat sales reached 13-year high in 2020, recreational boating boom to continue through 2021. *National Marine Manufacturers Association.* https://www.nmma.org/press/article/23527

Sun, H. (2013). *Cross-cultural technology design: Creating culture-sensitive technology for local users*. Oxford University Press.

U.S. Department of Homeland Security. (2016). *Float plan central: Official site of the float plan*. Retrieved July 8, 2022, from https://floatplancentral.cgaux.org

Verhulsdonck, G. (2017). Designing for global mobile: Considering user experience mapping with infrastructure, global openness, local user contexts and local cultural beliefs of technology users. *Communication Design Quarterly*, *5*(3), 55–62. https://doi.org/10.1145/3188173.3188179

Whorton, C. (2021, January 4). Categorical data, Jaccard's coefficient, and multiprocessing. *Towards Data Science*. https://towardsdatascience.com/categorical-data-jaccards-coefficient-and-multiprocessing-b4a7bd5d90f6

ABOUT THE AUTHORS

Dr. Guiseppe Getto is an associate professor of technical communication at Mercer University and is president and founder of Content Garden, Inc. a UX and content strategy consulting firm: http://contengarden.org. His research focuses on utilizing user experience (UX) design, content strategy, and other participatory research methods to help people improve their communities and organizations. He has published a co-edited collection, *Content Strategy in Technical Communication,* with Routledge. The findings of his research have been published in peer-reviewed journals such as *IEEE Transactions on Professional Communication*; *Technical Communication*; *Computers and Composition*; *Rhetoric, Professional Communication, and Globalization*; *Communication Design Quarterly*; and *Reflections*; as well as conference proceedings for the Association for Computing Machinery's Special Interest Group on Design of Communication (ACM SIGDOC). His work has also appeared in industry-based publications such as *Intercom* and *Boxes and Arrows*. He has taught at the college level for nearly twenty years and has consulted and formed research and service-learning partnerships with many nonprofits and businesses, from technical writing firms to homeless shelters to startups. He is also a poet. His first book, *Familiar History*, is currently available from Finishing Line Press: http://guiseppegetto.com/poetry/. Read more about him at: http://guiseppegetto.com. Dr. Getto can be reached at getto_ga@mercer.edu.

Dr. Suzan Flanagan is an assistant professor at Utah Valley University, where she teaches technical communication, editing, and collaborative communication. Her research focuses on technical and professional communication at the intersections of editorial processes, content strategy, and user experience (UX). She co-edited *Editing in the Modern Classroom* (Routledge, 2019). Dr. Flanagan can be reached at sflanagan@uvu.edu.

Localizing Content: The Roles of Technical & Professional Communicators and Machine Learning in Personalized Chatbot Responses

doi: https://doi.org/10.55177/tc148396

By Daniel Hocutt, Nupoor Ranade, and Gustav Verhulsdonck

ABSTRACT

Purpose: This study demonstrates that microcontent, a snippet of personalized content that responds to users' needs, is a form of localization reliant on a content ecology. In contributing to users' localized experiences, technical communicators should recognize their work as part of an assemblage in which users, content, and metrics augment each other to produce personalized content that can be consumed by and delivered through artificial intelligence (AI)-assisted technology.

Method: We use an exploratory case study on an AI-driven chatbot to demonstrate the assemblage of user, content, metrics, and AI. By understanding assemblage roles and function of different units used to build AI systems, technical and professional communicators can contribute to microcontent development. We define microcontent as a localized form of content deployed by AI and quickly consumed by a human user through online interfaces.

Results: We identify five insertion points where technical communicators can participate in localizing content:

- Creating structured content for bots to better meet user needs
- Training corpora for bots with data-informed user personas that can better address specific needs of user groups
- Developing chatbot user interfaces that are more responsive to user needs
- Developing effective human-in-the-loop approaches by moderating content for refining future human-chatbot interactions
- Creating more ethically and user-centered data practices with different stakeholders.

Conclusion: Technical communicators should teach, research, and practice competencies and skills to advocate for localized users in assemblages of user, content, metrics, and AI.

KEYWORDS: Localization, Chatbot, Assemblage, Case study, Content ecology

Practitioner's Takeaway

- Technical communicators can create structured content and information architecture that are easily accessible to and understood by chatbots.
- Technical communicators can develop stronger, data-informed user personas to create more effectively localized chatbots.
- Technical communicators can contribute to the user-focused interface design of chatbots and can moderate chatbot transcripts in localized context and recommend machine-learning program edits in response to poor user experience.
- Technical communicators can help to gather and deploy data ethically from technologies and stakeholders to develop more intelligent content for chatbots.

Daniel Hocutt, Nupoor Ranade, and Gustav Verhulsdonck

INTRODUCTION

Current content practices in technical and professional communication (TPC) are impacted by shifting user preferences for personalization and contexts of use when interacting with content. Users want content localized to them in the right time, place, and preferred device and personalized to them (Verhulsdonck et al., 2021). At the same time, technologies such as data analytics and artificial intelligence (AI) make it possible to understand and respond to users' needs by providing them with personalized content (Hocutt & Ranade, 2019; Ranade, 2019; Verhulsdonck et al., 2021). Such personalized content, sensitive to the user's location and preferences, is an important factor in localization. For this reason, TPC and user experience (UX) researchers are starting to look at how *microcontent*—a form of personalized content that pushes out snippets of information tailored to user queries (Loranger & Nielsen, 2017; McConnell, 2019)—helps in localization and in what TPC researchers can contribute to the process of creating and disseminating microcontent. To extend their work and to describe localized content development practices (especially for AI applications), this article presents an exploratory case study of a context-aware chatbot, Meena, using the critical lens of assemblage theory.

Localized content draws not only from users' needs but also from other characteristics such as location, demographics, and prior information-seeking behavior. For example, people can locate a restaurant that is near their current location; microcontent (information about that restaurant) is identified based on that user's location and preferences using data analytics and machine learning (ML: to develop a semantic understanding of user needs at that moment). Likewise, chatbots use Natural Language Processing (NLP) combined with ML to gauge the intent of what a user needs, formulate a response, and deliver microcontent tailored to the user. Localization is guided by the exchange between varying processes like data analysis, geolocation, ML, and NLP.

Such microcontent is guided by a solid understanding of the user and by pairing that understanding with content that performs well (based on its metrics) and is machine readable so the content can be deployed by AI in various contexts. Hence, rather than see content as written solely by technical communicators, work in TPC is part of a content ecology and, for localization purposes, requires our field's attention.

With that goal in mind, this article is organized in four sections. The first section explores the understanding of localization and argues that it is influenced by factors such as user, content, metrics, and AI. The second section uses assemblage theory to argue that user, content, metrics, and AI combine to form a dynamic, emergent agency to which technical communicators contribute, especially in AI applications. The third section explores an AI-driven chatbot, Meena, to demonstrate the activity of an assemblage. The fourth section draws specific takeaways for TPC practitioners and researchers on ways to participate in developing AI applications for localization.

LITERATURE REVIEW

Recent work has sought to localize usability through methods that engage users directly in iterative processes of research, design, testing, and deployment. Ethical participatory strategies engage users directly in research design (Rose & Cardinal, 2018; Zachry & Spyridakis, 2016). Researchers (Rose & Walton, 2018; Walton et al., 2019) noted our field's need to address social justice through critical technical communication (TC) practices that localize and foreground user issues. Our field has published limited research to address how technologies impact localization of users (Hocutt, 2018; Ranade, 2020; Verhulsdonck, 2018). Such localization relies on metrics, cookies, tracking, geographic position system (GPS) signals, etc. that help create semantic understanding for AI-driven interaction through, for instance, digital voice assistants and chatbots that react in a sensitive manner to immediate localized user needs (e.g., Beck, 2015; Ranade & Catà, 2021). The development of user-sensitive localization has led to "locally sensitive searches with other intent signals" (Hartman, 2020, p. 53) where users have come to expect personalization. We argue such *localized agency* is part of a content ecology where user, content, metrics (among which are tracking and GPS), and AI work together to create new forms of localization that our field should be studying.

User Focus in Localization

In 2013, Agboka redefined localization as a "user-driven approach, in which a user (an individual or the local community) identifies a need and works with the designer or developer to develop a mutually beneficial product that mirrors the sociocultural, economic, linguistic, and legal needs of the user" (p. 44). To understand users' perspectives, TC research, including social-justice work in TPC (Jones, 2016), proposes several methods, many that focus on collaborative community activities. Examples include the 3Ps framework of positionality, privilege, and power that pushes researchers to examine their own positionality and enactment of power and agency in a reflexive manner (Walton et al., 2019); participatory-action research that builds alliances between researchers and participants in planning, implementation, and dissemination of the research process (Agboka, 2013; Zachry & Spyridakis, 2016); decolonial approaches that offer a humanistic heuristic for researchers and practitioners to insert themselves into research (Haas, 2012); and research projects that benefit them (Rose & Cardinal, 2018). Such collaborative approaches provide important user data to move knowledge development forward.

Technological infrastructure used for collaboration activities is a crucial, yet under-studied, aspect of the data creation process. We believe that analyzing such infrastructural systems that drive localization can provide a new approach to examine AI-augmented microcontent through a social-justice lens. We explore chatbots as an important example of AI infrastructure to demonstrate users' participation as well as the resulting localization.

THEORETICAL FRAMEWORK

The lack of research about microcontent development in the field of writing and TC has led to several challenges. First, the information design of customizable content delivery tools that use data remains absent from TC work. Second, user voice and user agency are not adequately considered in microcontent, especially for underrepresented groups. Third, the effects of the process of developing such tools on organizational structures are ignored. In fact, the last challenge can be a cause for the first two. Data-based microcontent delivery platforms can be seen as a product of an assemblage, which conducts user analysis but creates a different type of localization driven by users, AI, content, and tracking and GPS metrics.

Our approach to localization is informed by distinguishing how users, content, metrics, and AI form an assemblage (Deleuze & Guattari, 1980/1987; see also Bennett, 2010; Bryant, 2014; Latour, 2005). Because these interrelationships can be traced but produce different forms of agency, our approach is to see these interactions from a post-digital perspective that blurs the line between human and non-human actors and situates them in post-human rhetorical contexts (e.g., Johnson-Eilola & Selber, 2022; Moore & Richards, 2018). We see agency as created by technological and non-technological exchanges (addressed by Miller, 2007). Such an approach positions agency as a meaning-making activity, like a speech act (Bazerman, 2004) that is exhibited in the intermixing of user actions, content creation through AI, metrics, and engaging with an interface in a particular location. This approach to agency articulates localization for contexts where ML takes place and technical communicators must negotiate shifting technological contexts as part of a continuously emerging assemblage.

Assemblages

The concept of an assemblage represents emergent agency produced by disparate human, technical, and systemic actors. An assemblage is a self-organizing ecosystem of actors whose combined activity perform agentive acts. In other words, an assemblage is a coalition of actors assembled to accomplish an act of meaning making that dis-assembles on completion of that act. Such an assemblage also functions to create new forms of localization.

An example that illustrates assemblage agency: A person uses a smartphone's search engine to ask for restaurant suggestions. In response, the smartphone displays a sorted list of nearby restaurants, ranked by rating and distance from the user's location along with reviews, photos, and maps to aid decision-making. The sorted list emerges from assemblage activity across a network of human, technical, and systemic actors. Its emergent activity dissipates in the results that the search pulls, although the actors that contributed to the search engine results page (SERP) remain in kinetic stasis (see Miller, 2007), awaiting the next call-to-action by another user. Such an assemblage uses ML and helps to understand the users in relation to their activities and

location and helps inform the next action. For example, the user might pick a restaurant that is less busy or one that has better reviews using location data parsed from user visits by time of day collated with restaurant reviews.

In this example, we can envision user, content, metrics, and AI as actors in assemblage agency (Hocutt, 2017, 2018) producing localization. **Users** are known through geolocation, browsing habits, search history, and smartphone-tracked habits as part of personal profiles or a digital twin (Fuller et al., 2020), which allows companies to make inferences and provide personalized results. **Metrics** about users—as timestamps, websites visited, and apps used—also make up the digital twin that is stored in the networked servers of corporate entities like Google, Facebook, Apple, Twitter, and Yelp. **AI**, in the form of ML algorithms with access to saved metrics from the user's past and current activity, is deployed through search to the user's current query and to indexed content. That **content**—which appears on the smartphone display in the form of restaurant listings, maps, photos, reviews, and ratings—is deployed in response to this query because AI-driven algorithmic processes match the user profile's metrics with indexed microcontent and the query to make restaurant recommendations.

Users in the Content Ecology

Users are the first component of the assemblage. We are using the term "users" to represent "human users," because in an assemblage, other non-human agents may be engaged in meaning-making activities. It is the human users for whom content is localized. Users engage in digital activities that can be monitored and recorded in the form of metrics. Because users are dynamic, their activities are in a continual state of flux to which the other elements of the assemblage must respond. Users generate content via digital tools as "produsers" (Toffler, 1971), as producers and consumers who co-create content and generate interaction data (Bruns, 2006). Users also generate metrics as they consume content. As users engage in daily activities supported by digital tools, their incoming and outgoing (produsing) data streams never end. In the context of assemblages, localization is a continually moving target to which AI is applied to help identify patterns and predict future actions that are then fed back to the user in a localized manner through personalized content.

We do not seek to obfuscate human agency with this portrayal of users or even to (necessarily) minimize user agency in assemblage relations. Users still decide if they will eat at the restaurant that a web search response recommended. But the moment they make that decision, content, metrics, and AI respond, collecting and providing localized information about the user's current (and likely future) state. Thus, we understand the user as an agent in continual interaction with other performative agents, engaging collectively in meaning-making activities.

Content

TC has deployed three distinct models of content development. Earlier models saw technical communicators responsible for writing whole documents and the role of what Evia (2018) called the "craftsman model" of TPC. Based on this role, technical communicators are responsible for crafting whole documents, which often include page design. As content moved online, technical communicators moved to view content as smaller components in larger information management systems, such as DITA, for XML compliance. This compliance allows for creating different documents such as website instructions, PDFs, and print documents from the same single-sourced XML-coded content. Current approaches in TC have adopted the paradigm of topic-based authoring, where content is broken into smaller pieces (or microcontent) to be deployed directly across different media such as website windows and apps and as part of larger documents (Andersen & Batova, 2015; Batova & Andersen, 2017; Bridgeford, 2020; Evia, 2018). This component of the content-management paradigm helped with single sourcing, content reuse, and findability.

The *microcontent* paradigm extends component content management to contextualized and increasingly fragmented content delivery because of increased search-engine use across mobile and connected devices. Microcontent is "audio, video, or text that can be consumed in 10–30 seconds" by users (McConnell, 2019, para. 1). Microcontent is also "a type of UX copywriting in the form of short text fragments or phrases, often presented with no additional contextual support" that is increasingly used to help users interface with a wide variety of mobile and connected devices (Loranger & Nielsen, 2017, para. 1). Microcontent is

a response to shifting demands of users who want to access relevant content with their mobile and connected devices without having to wade through a website. Microcontent is retrieved instantaneously, which means it must be machine readable and analyzed for effectiveness through metrics. That is, microcontent moves from a broadcast model to a localized model, where AI and metrics interact with that content and user queries to offer user's personalized content.

Metrics

A common saying in many modern organizations is "you cannot manage what you do not measure." Metrics form the basis of data collected to create a user's "digital twin" (Fuller et al., 2020). Metrics are incorporated into an assemblage to create localized agency; content is deployed as a result of a semantic understanding of the users and their digital footprint (through cookies, tracking pixels, etc.). Metrics are quantitative representations of user activities and characteristics, and TC is starting to consider how intelligent delivery is facilitated by semantic understanding of the user's *history* (the digital twin) and *intent* (what the user aims to do; Rockley & Cooper, 2012). As part of this work, we consider how metrics are now used to create personal profiles of users. For example, Google has developed the *HEART* framework to identify a user's *Happiness*, *Engagement*, *Adoption*, *Retention*, and *Task* success through various UX metrics (Joyce, 2020).

Many websites now use a rating system to understand how happy the user is with a service and if the user eagerly promotes that site (e.g., the Net Promoter Score). Likewise, websites capture how long a person engaged with that website, how many people adopt the website by signing up, and how many active users are retained over the years, while also capturing how many users were successful in accomplishing particular tasks. As such, metrics indicate not only a user's behavior but also their attitudes, and technical communicators need to consider how tracking such metrics can be used to develop better content and more personalized approaches.

Artificial Intelligence

Although ML is not part of the assemblage we have described, ML activity capitalizes on the relationships between other agents. Whereas "AI is the broad science of mimicking cognitive human abilities, ML is a specific subset of AI that trains a machine to learn" (Thompson et al., n.d., Artificial Intelligence and Machine Learning). ML algorithms are a branch of AI based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human intervention.

At their core, ML algorithms predict patterns based on available data sets. Thus, they determine input factors that can influence a target outcome. For example, Amazon's recommendation function is a result of ML that continuously analyzes the association between the likelihood a customer who buys one product might also like a related product. ML is used to continuously refine such association models. Together with metrics (which tabulate customer preferences), ML can help create AI-driven solutions that address user needs. As such, ML is important to help understand the user and pair information from the user's digital twin with overall web patterns.

So far, our goal has been to understand the workings of the assemblage of user, metrics, content, and AI to determine the role of technical communicators in constructing the assemblage. We investigate this by exploring Google's chatbot, Meena. We review current TC research on chatbots before revealing new dynamics of the assemblage of user, content, metrics, and AI in the construction of AI based chatbots. In turn, the analysis that follows will help us uncover new roles for technical communicators in AI application development, especially in localization contexts.

METHOD

Although localization can be conceptualized as a product of an assemblage of content, users, metrics, and AI, it can be demonstrated by exploring an AI application. In studying localization, we chose to study Meena—a chatbot application developed by Google that is built on an AI framework—to demonstrate how content, users, and metrics are at play to generate a personalized conversation experience for users. Google has engaged in chatbot development for the past few years. Meena is a result of complex data storage, retrieval, and processing that gets done through NLP and ML algorithms, trained on 40 billion words mined and filtered from public domain social media conversations (Adiwardana et al., 2020). The architecture of such algorithms is complex but helpful when understood to improve the accuracy of chatbot

responses, especially those that are used for information retrieval and to ensure they are just, not biased towards specific user groups.

Before selecting Meena, we studied several chatbots and referred to previous chatbot scholarship. The primary limitation with chatbots is that, in many cases, a researcher cannot know whether the chatbot is a human or AI. Meena is a purely AI chatbot, making it a top choice over other human-driven applications such as chatbots on telecommunication websites (Ranade & Catá, 2021). Human intervention will not appear in the middle of a conversation. A second limitation is that commercial chatbot architectures are black-boxed: that is, only developers know the inner workings, making that information inaccessible to researchers. However, research on Meena's design has been published and open for public access. The open access helped us dive deeper into the architecture and into the input and output data that impact conversations with Meena. The final challenge is access to AI chatbots. Meena is not available anymore; however, a repository with Meena is publicly shared on GitHub. Other chatbots like Cleverbot (Kim et al., 2019) are free to use, but their design and inner workings are black-boxed, rendering the output insufficient for our exploration.

Chatbots and Microcontent Responses to Human Queries

Chatbots are software programs used to interact and simulate conversations with users. They act like automated answering systems to respond to users' questions, thereby solving users' problems, either by giving or pointing users to where they can find more information. Conversational tools like chatbots are a common example of microcontent delivery platforms. The popularity of chatbots, especially in the customer-service industry, has encouraged technology companies to invest in chatbot development. Therefore, recent chatbots are being developed, using AI to make their interactions more human-like with higher content accuracy that adapts to users' needs. An example of a user-centered chatbot is a flight recommender chat tool deployed on Expedia's website: like a SERP, the chatbot uses user data and metrics to predict users' needs and provide relevant responses. For example, if a customer (**user**) asks for flight recommendations, the chatbot can use the customer's previous search history, travel itineraries, and other travel preferences (**metrics**) to provide recommendations that match that user's previous searches. Such a localized response (**content**) has a higher chance of positive reception by the customer. The response is generally precise and short—microcontent—and thus can be quickly consumed by the customer.

To deliver such a human-like conversational experience, chatbots are using AI and ML algorithms. These algorithms are complex but are capable of learning from their interactions with users and constantly are improving their performance of comprehension and information delivery. Singh and Beniwal's (2021) work demonstrated that data are a crucial component in the making of chatbots. Similarly, Ranade and Catà (2021) argued that, because technical communicators can work with data for information delivery purposes, they can contribute to chatbot development.

Evolution of Chatbots

Chatbot development has undergone a shift with big data storage, allowing for better memory and learning by chatbots and creating more advanced chatbots that can interact with users to various degrees of complexity. Different types of chatbots are distinguished from *basic* to *advanced* in their architecture to help the user; the more advanced, the better the user experience with chatbots.

- **Decision-tree based chatbots:** Similar to a guided menu, these types of chatbots are most basic and use buttons to communicate with the user. For instance, Facebook and LinkedIn use these types of chatbots to provide FAQ sections for a business; by clicking a button, the user gets pre-set conversation answers to common questions in a text chat.
- **Keyword recognition-based chatbots:** Similar to decision-tree chatbots, but intermediate in that they can recognize keywords, these chatbots can make decisions based on the keyword and can provide answers. For example, when refilling a prescription through a pharmacy phone system, these chatbots recognize keywords such as "speak to a person" and then connect the user with a human agent.
- **Contextual chatbots:** These advanced chatbots can have conversations and learn from the user. They can have mapped out conversational flow but also generate understanding of the user's language and intent. A chatbot such as Siri has contextual capabilities (Leah, 2022).

Various distinctions can be made based on how the chatbots are classified per the degree to which they are

task-oriented and their abilities to take in text or voice, their knowledge gathering is open or closed, or their design—if they are rule-based (decision-tree), retrieval based (keyword), or are more generative (contextual) (Hussain et al., 2019). Meena is a generative chatbot.

EXPLORATORY CASE STUDY

Because of the wide scope of network relations involved in an online chatbot, boundary conditions are needed to trace such assemblages (see Latour, 2005). As a result, we limit our scope to examining chatbots as a function of an assemblage of users, content, metrics, and AI. We offer an exploratory case study of Meena because the only available means of analysis is through Adiwardana et al.'s (2020) research report and transcribed sample conversations between Meena and humans. The information to which we have access provides adequate detail to explore the chatbot's function, tracing its ability to respond to user queries via localization through the lens of assemblage theory.

Technical communicators are important for AI development because AI requires good information architecture and structured data for learning purposes (Earley, 2018). However, a gap exists in studying AI applications (i.e., chatbots) and how they enact new ways of localization. This gap is slowly being addressed in TPC scholarship (e.g., Ding et al., 2019; Ranade & Catà, 2021). It is important that technical communicators integrate chatbots with existing content management systems to allow content reuse and create metadata for a "controlled taxonomy" to recognize users' speech acts (Ranade & Catà, 2021, p. 36). We extend that research to examine a new dynamic in TPC in which assemblages are responsible for creating new opportunities for collaboration and user involvement, contributing to a renewed method of studying localization.

Technical communicators can play an important role in the development of chatbots, like Meena, by moderating the content that is used to train them. Meena was trained using filtered conversations on social media (Adiwardana et al., 2020). This training ensures that the chatbot gives sensible responses. However, for information retrieval, content response must be accurate to meet users' needs. Content moderation is a crucial part of technical communicators' role and by moderating content, they can contribute to increasing chatbots' responses accuracy.

Conversational AI Architecture

To examine other contribution aspects, we need to understand the architecture of chatbots and analyze gaps in chatbot development that can be filled by TPC contributors. Three main components make up conversational AI architecture; each component is divided into basic sections that handle preliminary tasks (see Figure 1):

1. natural language understanding (NLU) unit
2. dialog management (DM) system
3. natural language generation (NLG) unit

NLU deals with the understanding of natural language inputs from users—a combination of two natural language understanding tasks, intent classification and entity extraction. Intent classification helps the agent understand "why users are asking those queries," while entity extraction deals with breaking down the input to make sense of "what the user is asking." Intent classification also helps the chatbot identify pieces of information discretely received from the user; the information and the intent, when combined, allow the agent to understand the user's input.

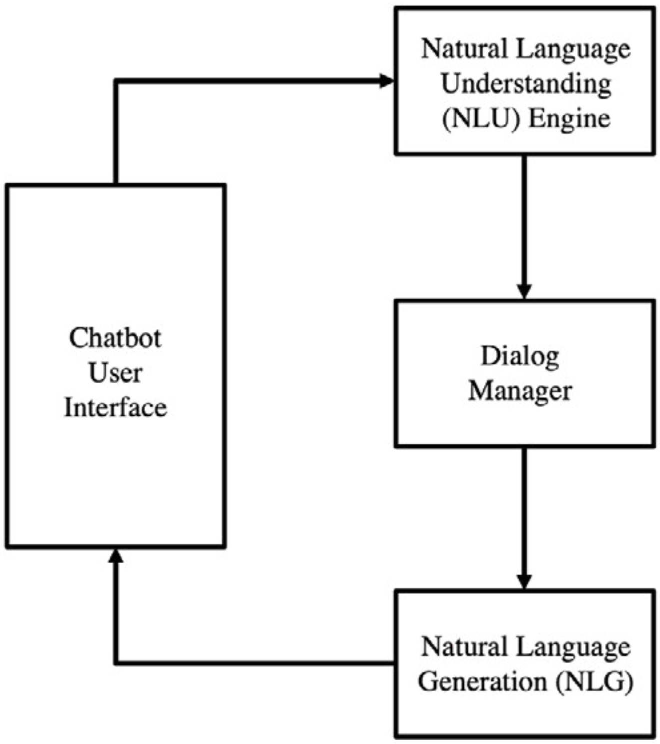


Figure 1. Conversational AI architecture, adapted from Kulkarni et al., 2019

Natural language understanding unit

Before NLP algorithm development, chatbots were primarily rule-based. They consisted of a series of *if-else* statements that compared users' requests to the *if* condition and, when a match was found, returned a response, *else*; then, the code moved on to the next *if*-condition comparison. If a match was never found, a null response was returned. If the question was formulated in a way not predicted by the developers and was not present in the code, the chatbot still returned a null response. NLP helps prevent the null response by understanding natural language, using keyword classification to understand questions regardless of the framing.

NLU is a branch of AI and a subset of NLP that uses computers to understand input made in the form of unstructured text or speech (Kulkarni et al., 2019). NLU is also programmed to understand meaning despite common human errors like transposed letters or words. The two most important functions of NLU are *entity* and *intent* recognition. *Entities* are particular terms that contain unique information that can help a conversational agent understand users' requests. *Intents* are the phrases that the user uses to communicate their goal/need from the chatbot. For example, Meena's responses for a question can be classified into *intents* and *entities* as shown in Figure 2. In the question, "do you recommend any good TV shows," *recommend* is the users' intent and *good TV shows* are entities that communicate "what" the user wants to be recommended. Neural networks (Kulkarni et al., 2019) are used to train NLU algorithms about the variety of intents and entities. Importantly, valid data that is used to train the algorithms can help to make sure that the NLU processing is error free.

For localized experiences, such data can be acquired from user comments, FAQs, forum discussions, and other spaces where user needs can be identified. Before being classified into intents and responses from a data set, users' responses are preprocessed to eliminate unnecessary information.

Dialog management system

The DM system develops an interaction strategy that can direct the agent that is choosing its actions based on the inputs that the user has relayed. Task-oriented DM systems are responsible for guiding the user from one state of the conversation to another to successfully achieve a predefined or dynamically understood task (Kulkarni et al., 2019). Dialog delivery is as important as dialog construction; a desirable characteristic of chatbots over search algorithms is their information design (Ranade and Catà, 2021). Chatbots provide a list of options for the user to confirm an inquiry or choose a more specific one, while web searches do not provide that feature.

Such forms of user inputs are also helpful to find out whether the users' problems are solved or if they need more help. Localization, or dialog personalization, is important to construct conversations that provide chatbots with more insights about the users, provide context-specific help, and ensure that the statements are unbiased. Rather than feeding the chatbot data from data collected through previous conversations, a more supervised dataset makes the chatbot more effective. In chatbot optimization—an assemblage of user responses,

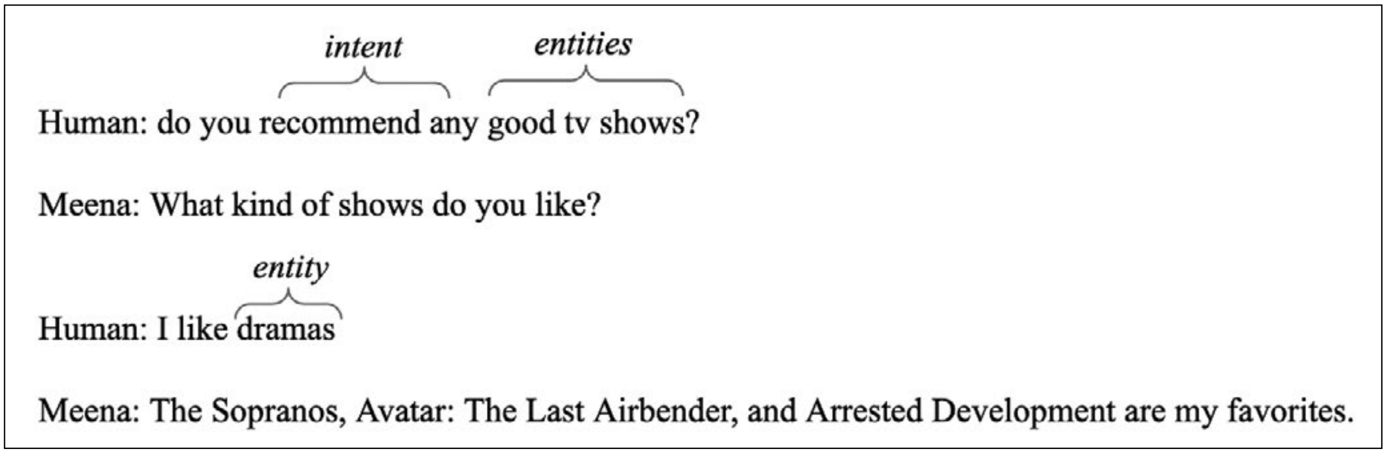


Figure 2. Classification of intents and entities in a sample Meena chat

chatbot dialog content, content metrics, and AI—analyzing this new localization form is important.

Natural language generation

A subdomain of NLP, NLG focuses on the methods of how responses are generated in natural language. The NLG module receives input from the DM system in a structured format. That format is based on the dialog history and the current context; it processes the history and input and produces an output sentence that sounds natural to humans and is also specific to the context (Kulkarni et al., 2019). Researchers have developed several algorithms for NLG, such as template-based or rule-based approaches, which are more static; the N-Gram Generator, which relies on keywords only, thus struggling with contextual understanding; and the Neural Network approach and Seq2Seq, which are both ML algorithms that train using reward systems. Optimal responses get generated because the chatbot predicts a reward at the end.

The conceptual architecture of conversational AI helped us understand and explore Meena.

Exploring the Meena Chatbot

Meena is an end-to-end, neural conversational model that learns to respond sensibly to a given conversational context (Adiwardana et al., 2020). It answers open-ended questions showing that a large end-to-end model can generate almost-human-like chat responses in an open-domain setting. The training aim while developing Meena was to minimize perplexity, the uncertainty of predicting the next token (e.g., word in a conversation). Meena's natural language quality is high, owing to the large number of datasets used to train it and the algorithms used for NLG. The Meena model has 2.6 billion parameters and is trained on 341 GB of text, filtered from public domain social media conversations (Adiwardana et al., 2020).

Deconstructing Meena's conversations, we can identify the role of content, metrics, and user information in the responses. Because the algorithm is not publicly available, we must rely on this mapping approach to track DM by reverse social engineering. Another challenge is that this chatbot is not publicly available; therefore, we had to rely on data generated

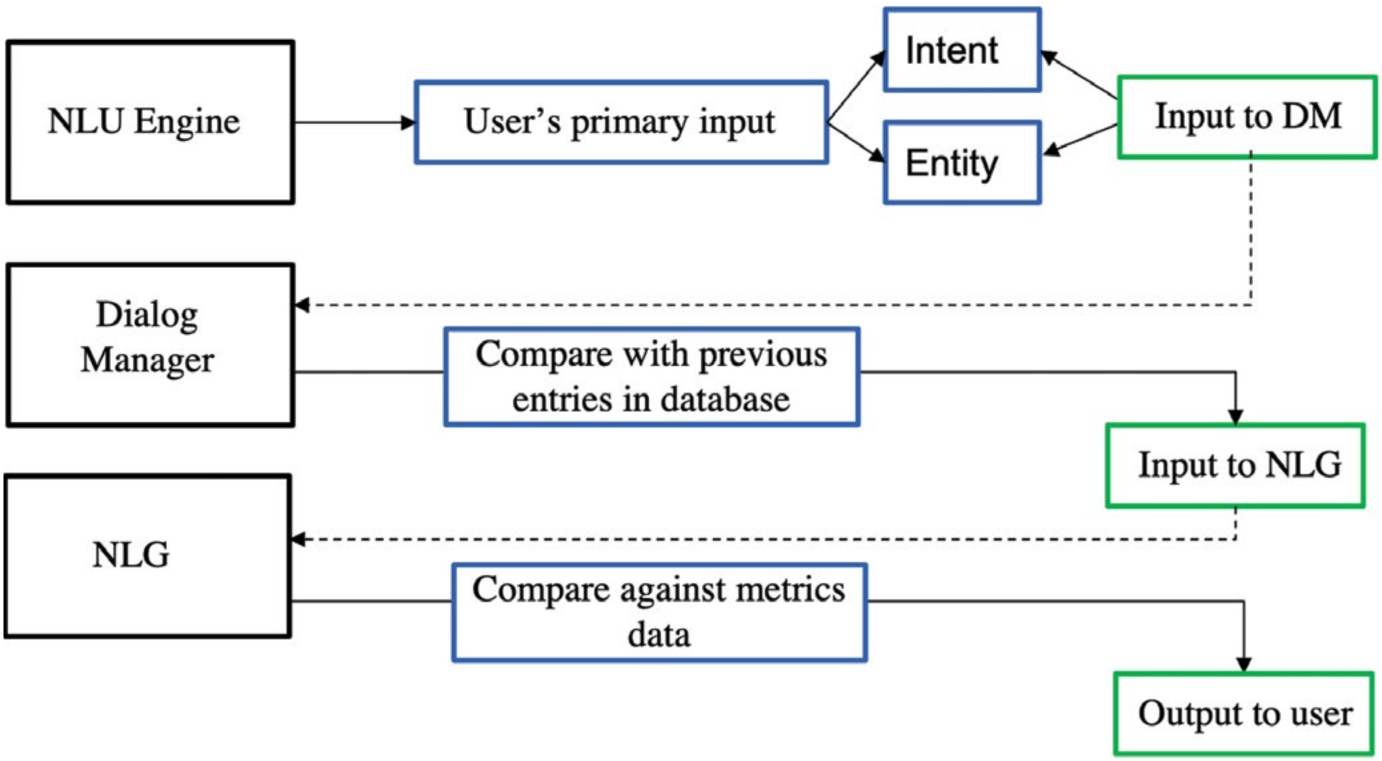


Figure 3. Visualization of Meena's functional units

by conversations recorded by researchers while they developed and/or tested the chatbot. We used tree graphs to break down available conversations.

Meena's Assemblage

"Learning AI is often embedded, invisible, and reliant on data collected from user interactions on platforms" (Grandinetti, 2021, AI Definitions, Terminology, and History, para. 3). The various components involved in chatbot's conversation design were necessary to separate the role of user data and algorithm design. Using the architectural components and components of the AI applications' assemblage mentioned previously, we designed a visualization (see Figure 3) to analyze smaller functional units of Meena: chatbot conversations.

Example Conversations

Conversations with Meena, and with various other chatbots, are available at https://github.com/google-research/google-research/tree/master/meena (GitHub, Inc., n.d.). These conversations were gathered during the chatbot testing process by test engineers and other stakeholders with access.

Following are three example chatbot conversations with Meena relevant to this research.

Sample conversation one

The first chatbot conversation (quoted directly from GitHub, Inc. [n.d.]) illustrates Meena's user recommendations for budget-friendly shopping places. Meena's suggestions (**microcontent**) are based on a list of shopping places (**data**) that are potentially worth visiting for the **user** based on their need (**metrics**). Because the user does not specifically provide what they want to shop for, Meena offers a variety of stores not selling the same commodities.

Human: Hi!

Meena: Hey! How's it going?

Human: Good. My wallet is recovering from the spending of the holidays, haha. Hbu?

Meena: Nice! I'm doing well!

Human: I am looking to save money on any future shopping. Where do you like to shop?

Meena: I like to shop at Five Below, Sally's Beauty Supply, and Old Navy. How about you?

Human: I love Sur La Table and Macy's. They're decent quality. What do you normally buy at Old Navy?

Meena: I'll have to check out Macy's! I like their socks, lol. What about you?

Sample conversation two

The second chatbot conversation (quoted directly from GitHub, Inc. [n.d.]) illustrates how Meena analyzes the definitions (**data**) of various disciplines provided by the **user**. Although at the beginning Meena points out the definition (**microcontent**), the chatbot also processes the similarities between the definitions of two different fields provided by the user and agrees to their argument.

Meena: Hello! How are you today?

Human: Which is a more useful subject, philosophy or psychology?

Meena: Psychology, definitely.

Human: Why?

Meena: Because it's the study of human behavior and mind.

Human: I think philosophy is also a study of human behavior and mind

Meena: I'd say it's more the study of ideas but I see what you're saying.

Sample conversation three

The third chatbot conversation (quoted directly from GitHub, Inc. [n.d.]) illustrates Meena educating the **user** on the correct term (**microcontent**) to use for their travel. Using the right term will help the user find the correct visa for the travel destination (**data**) based on their current location (**metrics**) and determine whether a visa is required. (Note the human's spelling error, which Meena still understands and, thus, concludes the conversation.)

Human: how about visa to dubai?

Meena: Do you live in Dubai?

Human: nope

Meena: Then you need a visa to get into Dubai, you won't get one as an American.

Human: why so?

Meena: It's just the way it is.

Human: ok

Meena: Glad we cleared that up :)

Human: how about a transit visa?

Meena: Transit visas are for tourists, not visas for travelers.

Human: am a tourist

Meena: Then you're a tourist, not a traveler.

Human: ok.. good byte

Meena: Bye, tourist.

Parsing a Conversation

To trace the role of user, content, metrics, and AI as an assemblage, we deconstruct the conversation further to identify the NLU, DM, and NLG components, using the first conversation for analysis. (The other two conversations can also be parsed in a similar manner.) For the NLU component, we constructed a tree graph to classify conversations into *intents* and *entities*. The tree graph for the first conversation is provided in Figure 4.

This tree graph reveals that, although we can rely on NLU algorithms to process entities and intents, NLG needs to be improved for greater accuracy. More precise localization could help ensure that users' needs are being met with their local experiences and contexts. Ultimately, the outcome does not measure whether user needs are fully met in these three conversations—a drawback of the exploratory case study. However, we can identify in the first conversation the disconnect between the user's questions and Meena's answers. We might consider this disconnect a problem of NLU, DM, or NLG, or we might recognize that ML remains unable to provide adequately localized responses. Examining Meena, we see such problems as an opportunity for technical communicators to understand localization as an assemblage issue requiring focus on content, users, and metrics to help create a more personalized AI-centered experience.

Data analytics helps us draw from users' information-seeking behavior to create user personas, helping us understanding their requests better and provide better solutions. Content development helps in using vocabulary that is unique, easier for chatbot algorithms to scrape, to land on the correct solution when an intent is analyzed from a problem statement. For example, in product documentation, if a user needs installation information, we can enable the chatbot's algorithm to trace who the user is and, using geographic data, where that user is, and we can use data analytics to find out the user's competence about the product, previous search history, and so on. An overarching view limits our ability to analyze these components. Therefore, we are using assemblage theory and characteristics of ecosystems to understand DM

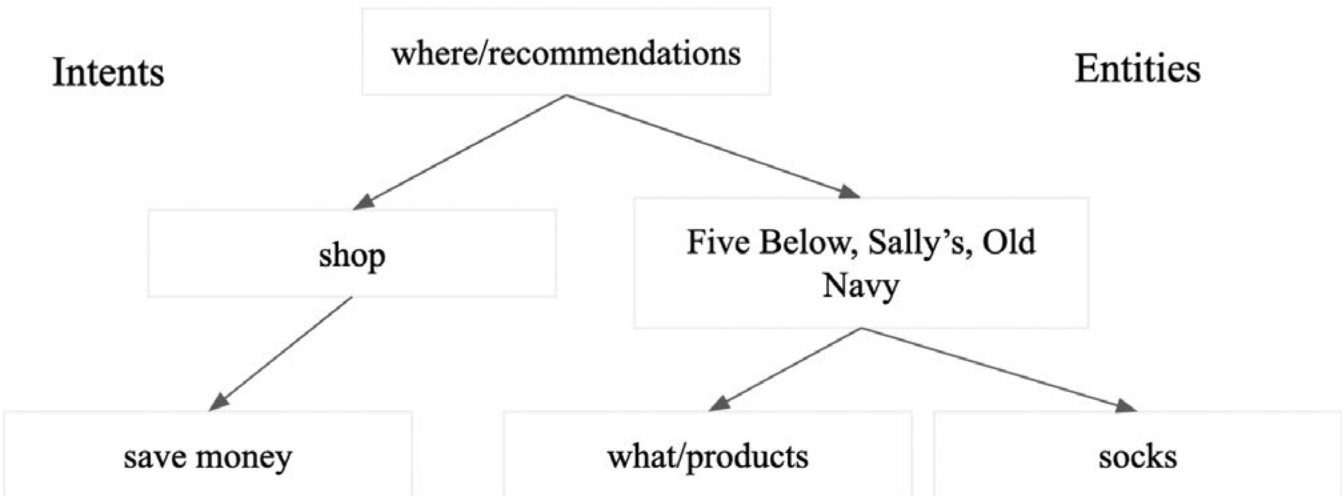


Figure 4. Classification of intents and entities in Meena

and NLG components of chatbots and the role of metrics, content, and users in it. From there, we can envision how technical communicators can contribute to increasing the effectiveness of chatbot responses to user needs.

Technical communicators pride themselves on being user-centered in their work and research. User experience, experience architecture, and usability studies all focus the attention of TPC on users. Chatbots and other smart products, powered by ML and AI, represent a new frontier for technical communicators' focus. Because a human user exists on the other end of the chatbot conversation, the TPC field's ability to represent the needs and interests of that user requires deep insight into the way chatbots receive input and generate hyper-localized responses. An AI-powered chatbot, like Meena, can localize the user using geographical **metrics** shared by a smartphone; connect the **user** to its hidden digital identity in the universe of data metrics; use algorithmic NLU to understand natural language meaning and likely intent (**AI**); and use its massive language training set and algorithmic NLG to provide a relevant, meaningful response to the user (**microcontent**). Representing the needs and interests of the human user in a Meena chatbot conversation requires developing a deep understanding of the chatbot conversation's ecosystem and treating the chatbot's activity as a unified, hyper-localized, contextualized assemblage. Understanding Meena as an assemblage agency whose combined actors include user, content, metrics, and AI, technical communicators can identify specific insertion points in the chatbot communication loop where they can effectively represent human user needs and interests.

Before discussing implications, we emphasize this point: human users are not independent actors in the AI-powered chatbot assemblage. Indeed, as Ranade (2020) has noted, this is the "real-time" audience of data analytics that offers our field different dynamics for localization. Though human users may initiate conversations, at the moment of their interaction with the chatbot, they are subsumed in the chatbot's assemblage activity. Users' locations are tracked in real time to enable meaningful, contextual, localized responses. Conversations in the chatbot include both human-generated and machine-learned algorithmic prompts and responses that are processed for intents and entities. Microcontent mined from the universe of metrics accessible to the chatbot is used to provide relevant responses in human user queries. Missing, however, is user-focused advocacy. As a result, we call on the field to identify and advocate insertion points in such ML assemblages.

IMPLICATIONS

Technical communicators need to address the new dynamics of assemblages where user, content, metrics, and AI work to address chatbot contexts. Johnson-Eilola and Selber (2022) have speculated that TC practice is itself an assemblage, and we find ourselves resonating with that speculation. As we have illustrated, chatbots provide localized microcontent that can help users in contextual ways. The intervention of technical communicators can advocate for users' needs in algorithm-centered activities like chatbot conversations for a more natural human-machine balance.

We offer potential insertion points into assemblage agency that technical communicators might consider advocating for human users. We encourage the field to identify others so we can train technical communicators for these new workplace practices.

Insertion Point One: Structured Content for Bot Consumption

Technical communicators hold ideal positions to create structured content and information architecture that is easily accessible to bots. Technical communicators can build online content that is effectively structured for algorithmic actors like webbots to understand in context. They can use markup language and structured data to ensure that chatbots or other bots can recognize, access, and understand content. The better the training content used for ML, the more effective algorithm-generated responses will be in chat conversations.

NLP is the algorithmic building block of conversational agents like chatbots. Creating web-based information architectures for chatbots using structured data to appropriately tag online content, provides effective training corpora for conversational agent training and ML. For example, Googlebots read the Speakable beta schema markup (Google, n.d.) to identify information prepared for text-to-speech responses by conversational agents like Google Assistant. When developing content, or when designing online interfaces, including Speakable markup helps

ensure that content is provided in a format easily identified and presented by conversational agents.

Insertion Point Two: Training Corpora for Data-Informed Personas

Another crucial skill that technical communicators bring to chatbots is their ability to develop stronger data-informed user personas to create more audience-aware chatbots. TC already uses a variety of tools to achieve these goals, including usability testing, user-centered design, and participatory research. Technical communicators, therefore, can be valuable in preparing an AI-powered agent using different corpora and personas so a chatbot can better address specific user interests and needs. For example, awareness of differently abled users seeking airline-travel information might ensure that text from social-media posts and online discussion boards authored by members of disability communities is used as a training corpus so the chatbot could more effectively respond to queries related to accessible resources for such users.

Technical communicators are ideally situated and trained to research and develop nuanced user profiles using existing audience analysis, data analytics from online behavior, and context-specific localized knowledge. Technical communicators could be involved in early stages of selecting appropriate text corpora for ML training for chatbots, helping identify effective training corpora for understanding and helping provide context- and user-appropriate NLG in responses. Hence, using both existing methods and novel approaches to data collection and analysis, technical communicators can develop detailed data-informed user personas that work in specific contexts. These personas can be used to identify the types of textual data that would be most useful to include more audience-aware content in chatbots.

Insertion Point Three: Chatbot Interface Design

Given that technical communicators also need to consider content in relation to the user experience, they are also ideally situated to consider how chatbot content functions regarding user-centered interface design. Although algorithms may require training to understand when a conversational agent shifts from human user to chatbot, users require ability to recognize when the chatbot is preparing a response, when the chatbot has finished speaking, and when a response is expected. Familiarity with new and emerging standards for conveying text conversation activities effectively can be employed, as can recommendations for effective prompts for calls to action on the part of the human user. For example, in a text conversation using a smartphone, using alternating left and right justification of messages, differently colored message "bubbles," and the speaker's identity to each message can help differentiate human and chatbot responses. Using the familiar "three dots in motion" to represent when a chatbot is preparing a response can help human users, who are accustomed to such responses in human-to-human text conversations. Subtle design tweaks identifying when messages are both read and received by each participant in the conversation can help human users recognize that the chatbot has received their message. Technical communicators can apply audience research to localize interface designs for platforms (e.g., desktop, tablet, smartphone); accessibility (e.g., text readers for blind users, audio readers for deaf users); and contexts (e.g., low-light environments, silent reading rooms, airplanes).

Insertion Point Four: Response Moderation in Conversations

As user-focused practitioners and researchers, technical communicators have unique skills to moderate chatbot transcripts and to recommend programming edits based on poor user experience, whether reported by the human user or identified by the technical communicator. Human-in-the-loop oversight of algorithm-generated content is an important aspect of ensuring human user experiences are successful and satisfactory, without unintentional or programmed bias and discrimination. Noble (2018) is among a growing chorus of scholars (for others, see Akter et al., 2021; Turner Lee et al., 2019) concerned about algorithmic bias, and while addressing that bias by encouraging more inclusive programming is important, so too is moderating machine-learned outputs in AI-powered chatbots. Engaging technical communicators in reviewing chatbot conversations with human users, especially when contextual data available to the chatbot algorithm is made available in human-readable form, can confirm the accuracy, reliability, and appropriateness of chatbot responses to human queries. Combining audience analysis and human user feedback with user data points available to

the chatbot (e.g., geographical location, conversation prompt, user online behavior, perhaps prior purchasing decisions), technical communicators can review a representative sample of chatbot conversations to determine the extent to which they appropriately meet the human users' needs or when a handoff to a human is crucially needed in the future for recurring issues. Most importantly, technical communicators should have opportunities to make recommendations to programmers and engineers to tweak responses based on their analysis, perhaps by recommending additional machine-learning training corpora or review of natural language understanding and NLG.

Insertion Point Five: Engage Stakeholders to Deploy Data in More Ethical and User-Centered Ways

Crucially, technical communicators are also well-situated to leverage more data-informed and ethical deploying of data with various stakeholders to develop intelligent content for chatbots. For example, Saunders (2018) has pointed to the convergence of digital marketing techniques in the TC field where interactive technologies are "charged with the task of creating intelligent content that is ready to serve the demands of new and yet unimagined interactive channels" (p. 10).

One of the authors works as a web manager on a school's marketing and engagement team, bridging the gap between TC researcher and marketing professional. Indeed, Verhulsdonck et al. (2021), Verhulsdonck & Tham (2022), and Tham et al. (2022), among others, have identified the importance of developing intelligent content in TC.

Although marketing is often focused on "conversion" (getting people to make a purchase or perform a particular action), the influence of data-driven techniques employed by digital marketing analytics on TC must be recognized. Indeed, both focus on how (intelligent) content, user, metrics, and AI can be leveraged to better address various audience objectives.

Earley (2018) recognized this convergence by noting how technical communicators can leverage user-centered techniques to create a user journey by identifying 1) important touchpoints for the user; 2) the user's wants, needs, thoughts and emotional states during an interaction; 3) sources and best channels to deploy content to help the user; 4) areas to evaluate and improve content; and 5) areas where further refining is needed or a handoff to a human operator is needed by a chatbot. As such, technical communicators are crucial to this cycle of "measure, manage, govern, and improve" to help develop better on-going processes (p. 14). Such an iterative approach is crucial to create responsible AI chatbots that continuously employ contextual and situational understandings of the user. Given that many companies now employ customer-relationship management systems that store customer data, technical communicators must be involved to guide how data can be used in ethical and responsible ways. A fruitful relationship with *marcomm* can help *techcomm* design human user experiences that are localized and contextualized appropriately while also addressing ethical issues.

CONCLUSION

The concept of an assemblage is important for technical communicators to better understand the way content is localized and enacted in AI-powered online technologies like chatbots. User, content, metrics, and AI engage in complex relations to produce meaningful conversations that respond immediately to contextual changes of the user like their location, preference, and behavior. We recommend that technical communicators play a role in advocating for human users in such content ecologies to better localize microcontent for users. To do so, we explored the Meena chatbot to reveal its architecture and reliance on ML to provide microcontent, based on training datasets selected by engineers. From this exploration, we have identified five specific insertion points in the design, development, deployment, use, and measurement of conversational agents where technical communicators better localize and meet the needs and interests of human users.

Our use of the assemblage reveals a novel conception of TC as engaging in a content ecology of user, content, metrics, and AI to localize information more meaningfully. The skills needed to navigate this interactive, dynamic ecosystem differ from those traditionally taught in technical communication courses. Technical communicators should have a general understanding of the way AI and ML are used to generate content; the way digital identities are collected, available, and used in such assemblages to localize content and responses; and the way metrics

are collected, curated, and implemented in localizing responses to users. We do not call for technical communicators to become data scientists or computer programmers, but we believe that the explosion of AI and ML in communication practices, along with the availability of enormous datasets containing user behaviors in the form of metrics, requires additional skills of technical communicators. Specifically, we advocate that TC curricula consider adding foundational skills in data analytics, NLP, geolocation, and ML to their outcomes.

We should not expect ML, despite its capacity for ingesting and processing data, to communicate effectively with users (or evolve) on its own. Without intervention by technical communicators, ML will continue to train on biased discourse, continuing to marginalize those already marginalized by those discourses, or foster black-boxed processes that perpetuate discrimination or lack of explanation or transparency of decision-making to users. Indeed, chatbots are important to help localize where the user is but also to develop explainable AI that meets the user where they are. Users will benefit from technical communicators engaging with designing conversational agents, and better user experiences are in everyone's best interests.

ABOUT THE AUTHORS

Dr. Daniel L. Hocutt serves as the web manager on the marketing & engagement team at the University of Richmond School of Professional & Continuing Studies in Richmond, VA. He also serves as an adjunct professor of liberal arts in the same school, teaching composition, technical communication, and research methods. His research interests are at the intersection of rhetoric, technology, and users, focusing on the rhetorical influence of AI-driven algorithmic processes in digital spaces on user experience. He's published in journals including *Present Tense*, *Computers & Composition*, and the *Journal of User Experience* along with several edited collections. Dr. Hocutt can be reached at dhocutt@gmail.com.

Dr. Nupoor Ranade is an assistant professor of English at George Mason University. Her research addresses knowledge gaps in the fields of technical communication practice and pedagogy, and focuses on professional writing and editing, inclusive design, and ethics of AI. Through her teaching, Nupoor tries to build a bridge between academia and industry and help students develop professional networks while they also contribute to the community that they are part of. Her research has won multiple awards and is published in journals including but not limited to *Technical Communication*, *Communication Design Quarterly*, *Kairos*, and *IEEE Transactions on Professional Communication*. Dr. Ranade can be reached at nranade@gmu.edu.

Dr. Gustav Verhulsdonck is an assistant professor in business information systems at Central Michigan University. His research interests are user experience design, technical and business communication, behavioral design, and mobility. He has worked as a technical writer for International Business Machines (IBM) and as a visiting researcher for the University of Southern California's Institute for Creative Technologies. He also worked as a consultant for clients such as the National Aeronautics and Space Administration (NASA) and the U.S. Army Research Laboratory. His research has appeared in the *International Journal of Human-Computer Interaction*, *Journal of Technical Writing and Communication*, *Journal of Business and Technical Communication*, *Computers and Composition*, *ACM's Communication Design Quarterly*, and *Technical Communication Quarterly*. Dr. Verhulsdonck can be reached at gverhulsdonck@gmail.com.

REFERENCES

Adiwardana, D., Luong, M.T., So, D. R., Hall, J., Fiedel, N., Thoppilan, R., Yang, Z., Kulshreshtha, A., Nemade, G., Lu, Y. & Le, Q. V. (2020). Towards a human-like open-domain chatbot. *arXiv*. https://arxiv.org/abs/2001.09977

Agboka, G. Y. (2013). Participatory localization: A social justice approach to navigating unenfranchised/disenfranchised cultural sites. *Technical Communication Quarterly, 22*(1), 28–49. https://doi.org/10.1080/10572252.2013.730966

Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y. K., D'Ambra, J., & Shen, K. N. (2021). Algorithmic bias in data-driven innovation in the age of AI. *International Journal of Information Management, 60*, 1–13. https://doi.org/10.1016/j.ijinfomgt.2021.102387

Andersen, R., & Batova, T. (2015). The current state of component content management: An integrative literature review. *IEEE Transactions on Professional Communication 58*(3), 247–270. https://doi.org/10.1109/TPC.2016.2516619

Batova, T. & Andersen, R. (2017). A systematic literature review of changes in roles/skills in component content management environments and implications for education. *Technical Communication Quarterly, 26*(2), 173–200. https://doi.org/10.1080/10572252.2017.1287958

Bazerman, C. (2004). Speech acts, genres, and activity systems: How texts organize activities and people. In C. Bazerman & P. Prior (Eds.), *What writing does and how it does it: An introduction to analyzing texts and textual practices* (pp. 309–340). Routledge.

Beck, E. N. (2015). The invisible digital identity: Assemblages in digital networks. *Computers and Composition, 35*, 125–140. https://doi.org/10.1016/j.compcom.2015.01.005

Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Duke University Press.

Bridgeford, T. (Ed.). (2020). *Teaching content management in technical and professional communication*. Routledge.

Bruns, A. (2006). Towards produsage: Futures for user-led content production. In *Proceedings of the 5th International Conference on Cultural Attitudes towards Technology and Communication* (pp. 275–284).

Bryant, L. R. (2014). *Onto-cartography: An ontology of machines and media*. Edinburgh University Press.

Deleuze, G., & Guattari, F. (1987). *A thousand plateaus: Capitalism and schizophrenia*. (B. Massumi, Trans.). University of Minnesota Press. (Original work published 1980).

Ding, H., Ranade, N., & Catà, A. (2019, October). Boundary of content ecology: Chatbots, user experience, heuristics, and pedagogy. In *Proceedings of the 37th ACM International Conference on the Design of Communication*. https://doi.org/10.1145/3328020.3353931

Earley, S. (2018). AI, chatbots and content, oh my! (Or technical writers are doomed—to lifelong employment). *Intercom, 65*(1), 12–14.

Evia, C. (2018). *Creating intelligent content with Lightweight DITA*. Routledge.

Fuller, A., Fan, Z., Day, C., & Barlow, C. (2020). Digital twin: Enabling technologies, challenges and open research. *IEEE Access, 8*. https://doi.org/10.1109/ACCESS.2020.2998358

GitHub, Inc. (n.d.). Toward a human-like open-domain chatbot. https://github.com/google-research/google-research/tree/master/meena

Google. (n.d.). Speakable (BETA) schema markup. Google Search Central. https://developers.google.com/search/docs/advanced/structured-data/speakable

Grandinetti, J. (2021). Examining embedded apparatuses of AI in Facebook and TikTok. *AI & Society*. https://doi.org/10.1007/s00146-021-01270-5

Haas, A. M. (2012). Race, rhetoric, and technology: A case study of decolonial technical communication theory, methodology, and pedagogy. *Journal of Business and Technical Communication, 26*(3), 277–310. https://doi.org/10.1177/1050651912439539

Hartman, K. (2020). *Digital marketing analytics: In theory and in practice.* Amazon Digital Services LLC—KDP Print US.

Hocutt, D. L. (2017). The complex example of online search: Studying emergent agency in digital environments. In *Proceedings of the 35th ACM International Conference on the Design of Communication* (pp. 1–8). https://doi.org/10.1145/3121113.3121207

Hocutt, D. L. (2018). Algorithms as information brokers: Visualizing rhetorical agency in platform activities. *Present Tense, 6*(3). http://www.presenttensejournal.org/?s=Algorithms+as+information+brokers

Hocutt, D. L., & Ranade, N. (2019). Google Analytics and its exclusions. *Digital Rhetoric Collaborative Blog Carnival 16*. https://www.digitalrhetoriccollaborative.org/2019/12/19/google-analytics-and-its-exclusions

Hussain, S., Ameri Sianaki, O., & Ababneh, N. (2019, March). A survey on conversational agents/chatbots classification and design techniques. In *Workshops of the International Conference on Advanced Information Networking and Applications* (pp. 946–956). Springer.

Localizing Content in Chatbot Responses

Johnson-Eilola, J., & Selber, S. (2022). Technical communication as assemblage. *Technical Communication Quarterly*. Advance online publication. https://doi.org/10.1080/10572252.2022.2036815

Jones, N. N. (2016). The technical communicator as advocate: Integrating a social justice approach in technical communication. *Journal of Technical Writing and Communication, 46*(3), 342–361. https://doi.org/10.1177%2F0047281616639472

Joyce, A. (2020). 7 steps to benchmark your product's UX. Nielsen Norman Group. https://www.nngroup.com/articles/product-ux-benchmarks

Kim, N. Y., Cha, Y., & Kim, H. S. (2019). Future English learning: Chatbots and artificial intelligence. *Multimedia-Assisted Language Learning*, 22(3), 32–53.

Kulkarni, P., Mahabaleshwarkar, A., Kulkarni, M., Sirsikar, N., & Gadgil, K. (2019). Conversational AI: An overview of methodologies, applications & future scope. In *2019 5th International Conference on Computing, Communication, Control and Automation* (pp. 1–7). https://doi.org/10.1109/ICCUBEA47591.2019.9129347

Latour, B. (2005). *Reassembling the social: An introduction to Actor-Network-Theory*. Oxford University Press.

Leah. (2022, May 26). The ultimate guide to chatbots in business. *Userlike*. https://www.userlike.com/en/blog/chatbots

Loranger, H., & Nielsen, J. (2017). Microcontent: A few small words have a mega impact on business [Web log]. Nielsen Norman Group. https://www.nngroup.com/articles/microcontent-how-to-write-headlines-page-titles-and-subject-lines

McConnell, L. (2019). Microcontent and what it means for communication and technical writing [Web log]. Best practices in strategic writing. http://blogs.chatham.edu/bestpracticesinstrategiccommunication/2019/04/18/microcontent-and-what-it-means-for-communication-and-technical-writing

Miller, C. R. (2007). What can automation tell us about agency? *Rhetoric Society Quarterly, 37*(2), 137–157. http://doi.org/10.1080/02773940601021197

Moore, K. R, & Richards, D. P. (Eds.). (2018). *Posthuman praxis in technical communication.* Routledge.

Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism.* New York University Press.

Ranade, N. (2019). World interaction design day event report on gendered AI [Web log]. Digital Rhetoric Collaborative Blog. https://www.digitalrhetoriccollaborative.org/2019/11/26/world-interaction-design-day-event-report-on-gendered-ai

Ranade, N. (2020, October). The real-time audience: Data analytics and audience measurements. In *Proceedings of the 38th ACM International Conference on Design of Communication* (pp. 1–2). https://doi.org/10.1145/3380851.3418613

Ranade, N., & Catá, A. (2021). Intelligent algorithms: Evaluating the design of chatbots and search. *Technical Communication*, *68*(2), 22–40.

Rockley, A., & Cooper, C. (2012). *Managing enterprise content: A unified content strategy*. New Riders.

Rose, E., & Cardinal, A. (2018). Participatory video methods in UX: Sharing power with users to gain insights into everyday life. *Communication Design Quarterly, 6*(2), 9–20. https://doi.org/10.1145/3282665.3282667

Rose, E. J., & Walton, R. (2018). Factors to actors: Implications of posthumanism for social justice work. In K. R. Moore & D. P. Richards (Eds.), *Posthuman praxis in technical communication* (pp. 91–117). Routledge.

Saunders, C. (2018). A new content order for the multi-channel, multi-modal world. *Intercom, 65*(1), 9–11.

Singh, S., & Beniwal, H. (2021). A survey on near-human conversational agents. *Journal of King Saud University-Computer and Information Sciences*. Advance online publication. https://doi.org/10.1016/j.jksuci.2021.10.013

Tham, J., Howard, T., & Verhulsdonck, G. (2022). Extending design thinking, content strategy, and artificial intelligence into technical communication and user experience design programs: Further pedagogical implications. *Journal of Technical Writing and Communication*. Advance online publication. https://doi.org/10.1177%2F00472816211072533

Thompson, W., Li, H., & Bolen, A. (n.d.). Artificial intelligence, machine learning, deep learning and beyond. Understanding AI technologies and how they lead to smart applications. *SAS Insights.* https://www.sas.com/en_us/insights/articles/big-data/artificial-intelligence-machine-learning-deep-learning-and-beyond.html

Toffler, A. (1971). *Future shock.* Pan.

Turner Lee, N., Resnick, P., & Barton, G. (2019). *Algorithmic bias detection and mitigation: Best practices and policies to reduce consumer harms.* Center for Technology Innovation. Brookings.

Verhulsdonck, G., Howard, T. & Tham, J. (2021). Investigating the impact of design thinking, content strategy, and artificial intelligence: A "streams" approach for technical communication and UX. *Journal of Technical Writing and Communication, 51*(4), 468–492. https://doi.org/10.1177/00472816211041951

Verhulsdonck, G., & Tham, J. (2022). Tactical (dis) connection in smart cities: Postconnectivist technical communication for a datafied world. *Technical Communication Quarterly*. Advance online publication. https://doi.org/10.1080/10572252.2021.2024606

Verhulsdonck, G. (2018). Designing for global mobile: Considering user experience mapping with infrastructure, global openness, local user contexts and local cultural beliefs of technology use. *Communication Design Quarterly Review*, *5*(3), 55–62. https://doi.org/10.1145/3188173.3188179

Walton, R., Moore, K. R., & Jones, N. N. (2019). *Technical communication after the social justice turn: Building coalitions for action*. Routledge.

Zachry, M., & Spyridakis, J. H. (2016). Human-centered design and the field of technical communication. Journal of Technical Writing and Communication, 46(4), 392–401. https://doi.org/10.1177%2F0047281616653497

Review of Three Books on Language Teaching for Multilingual Students

By Barbara Jungwirth

INTRODUCTION

All three books are part of the "New Perspectives on Language and Education" series by Multilingual Matters and address teaching language to multilingual students at the university level (Table 1). Only *Crossing Borders, Writing Texts, Being Evaluated: Cultural and Disciplinary Norms in Academic Writing* considers languages other than English as foreign languages. It is a collection of studies, as is *Linguistic Justice on Campus: Pedagogy and Advocacy for Multilingual Students*, while *Creating Digital Literacy Spaces for Multilingual Writers* is authored by one person. All three books acknowledge inequities, but only the two collections note the power asymmetries inherent in academia in the Global North. *Crossing Borders, Writing Texts, Being Evaluated* seems most useful to researchers, especially those in linguistics. *Linguistic Justice* calls for validating students' multilingual voices and provides recommendations for writing centers on how to do so but does not sufficiently address the competing student goal of passing courses with professors who may be focused on standard academic English. *Creating Digital Literacy Spaces for Multilingual Writers* discusses incorporating common digital platforms into teaching writing to multilingual students, but frequently repeats the same points. Read *Linguistic Justice on Campus* if you are looking for practical advice. Otherwise, read *Crossing Borders, Writing Texts, Being Evaluated* if you are interested in linguistic research.

CROSSING BORDERS, WRITING TEXTS, BEING EVALUATED: CULTURAL AND DISCIPLINARY NORMS IN ACADEMIC WRITING

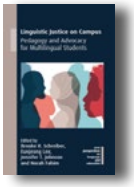
Crossing Borders is a collection of studies focused on the cultural rather than linguistic issues encountered by people who study at the university level in the Global West. The book idea originated in symposia in New Zealand and the US. Three of its authors teach Norwegian and Finnish, respectively, as foreign languages, one teaches English in China, while the remainder work at institutions in English-speaking countries, such as New Zealand. Authors note that every academic discipline has its own vocabulary and conventions, which even native speakers of the dominant language—e.g., English—must learn. At the university level, pre-enrollment language tests act as gatekeepers for international students, even though test questions may have little relevance to the overt and covert conventions in a given field of study.

Despite blind evaluation of tests, raters' biases may creep in since a student's first language can often be guessed based on specific non-standard phrases or grammatical features used. Even when such linguistic "deficiencies" were corrected, essays written in Norwegian by native Vietnamese speakers were rated differently from those written by native Spanish speakers, one study reported. This may be due to the rhetorical conventions common in the immigrants' home countries compared to the rhetoric expected by the Norwegian raters.

In English-language universities, a specific variety of standard English may be expected. Students from India or Singapore who grew up speaking English have been told that their English is inadequate for studying at a New Zealand university. Such experiences may affect students' belief in their ability to get a degree in their chosen field. Universities are also power hierarchies that students—native and immigrant alike—need to learn to navigate. However, differing concepts of authorship and textual appropriation, as well as approaches to hierarchies in general, may make such navigation more difficult for some international students.

By Barbara Jungwirth

LINGUISTIC JUSTICE ON CAMPUS: PEDAGOGY AND ADVOCACY FOR MULTILINGUAL STUDENTS



The collection of articles in *Linguistic Justice on Campus* focuses on English as a Second Language at North American universities. Articles include recommendations for changing academic writing centers' approaches to supporting students unfamiliar with English for academic purposes. They also note that writing center volunteers may be monolingual English speakers who need training in validating non-standard expressions.

Different types of knowledge—including those of indigenous communities—and their inclusion at Western-style universities are also addressed. Teachers should survey their students' language use, including switching between languages and registers depending on audience and situation, and combining features from two or more languages to articulate their thoughts in their own voices. Students' diverse backgrounds can enrich class discussions and provide hitherto unconsidered approaches to assigned materials.

While writing in their own voice may be an important goal, students are also worried about how their professors might evaluate the texts they write. Ideally, speaking multiple languages or bringing a non-mainstream cultural background to class would be considered an asset. Unfortunately, that is not always the case. The book considers this tension between what should be and what is. However, it does not adequately address how to help students whose teachers do not value diversity in practice.

Beyond individual professors, not all institutions are likely to be receptive to implementing the suggestions

Table 1. Books on language teaching for multilingual students compared

	Crossing Borders	Linguistic Justice	Digital Literacy Spaces
Audience	Language researchers	Writing center staff	Writing instructors
Major Strengths	• Acknowledges power hierarchies in universities • Discusses role of language tests as gatekeepers • Not solely focused on English as a foreign language • Addresses evaluator biases	• Acknowledges different types of knowledge – including that of indigenous communities • Includes recommendations for specific trainings that writing centers can implement • Notes power asymmetry in academia • Considers inequities beyond language	• Acknowledges unequal access to and economic constraints on digital tools • Discusses several common digital platforms, such as blogging and MOOCs • Also addresses the publishing system
Major Weaknesses	• Non-linguists may not be familiar with the terminology used • Some points made with samples from other languages are difficult to retrace in the English translations provided	• Not all suggestions may be implementable at a particular institution • Insufficiently addresses tension between linguistic justice and desire for academic success	• Often repetitive • Needs thorough copy-editing • Does not address newer platforms, such as Instagram or Twitter
Comments	Inclusion of non-English foreign languages is helpful, but some content is rather technical for non-linguists	Emphasizes importance of multilingual students' own voices, but inadequately considers their need to pass courses	Raises interesting issues but is rather repetitive and may be outdated relatively soon
Rating (5-star scale)	***	***	*
Cost (USD)	$39.95	$49.95	$49.95

for changes to writing center practices in some of the articles. However, it never hurts to try and even incremental changes may help multilingual students now and in the future.

CREATING DIGITAL LITERACY SPACES FOR MULTILINGUAL WRITERS

Unlike the other two books, *Creating Digital Literacy Spaces for Multilingual Writers* is written by a single author. It discusses the incorporation of several digital platforms and tools, such as blogging or massive online open courses (MOOCs), into teaching multilingual writers at the university level. Multimodality—the inclusion of images and sound—as well as "flipped learning" (p. 140), which provides more individualized experiences, are also covered as different forms of literacy. Bloch discusses helping students who may not be fluent in Standard English for Research Purposes to handle writing assignments in an academic environment. He also discusses how to prepare such students for publishing their research. Two of the eight chapters are devoted to publishing, including one on deciding where to submit research and on identifying predatory journals.

Another issue discussed at various points in the book is "textual borrowing" (p. 12). The extent to which text from other sources can be incorporated in a student's own writing, as well as copyright laws, differ across the world. Similarly, expectations for critical assessment of material from published authors may not be clear to students from countries where such critique would not be welcome. Online sites that detect plagiarism may be helpful in teaching these distinctions. However, as with other digital tools, privacy concerns arise. Furthermore, digital spaces may not always be accessible or affordable, especially for students from the Global South.

Perhaps inevitable given how long the print publishing process takes, the author does not discuss newer digital platforms, such as Instagram. Also, the URLs and tools cited may be outdated long before a new edition of the book is printed. *Creating Digital Literacy Spaces for Multilingual Writers* raises several interesting issues. However, it would benefit from an editing pass to eliminate—sometimes verbatim—repetitions. Copyediting for standard English grammar and usage would also be helpful.

REFERENCES

Bloch, Joel. (2021). *Creating Digital Literacy Spaces for Multilingual Writers*. Multilingual Matters. [ISBN 978-1-180041-078-7. 296 pages, including index. US$49.95 (softcover).]

Golden, Anne, Lars Anders Kulbrandstad, and Lawrence Jun Zhang, eds. (2021). *Crossing Borders, Writing Texts, Being Evaluated*. Multilingual Matters. [ISBN 978-1-78892-8557. 184 pages. US$39.95 (softcover).]

Schreiber, Brooke R., et al., eds. (2021). *Linguistic Justice on Campus: Pedagogy and Advocacy for Multilingual Students*. Multilingual Matters. [ISBN 978-1-78892-948-6. 248 pages, including index. US$49.95 (softcover).]

ABOUT THE AUTHOR

Barbara Jungwirth writes about medical topics (www.bjungwirth.com) and translates medical and technical documents from German into English (www.reliable-translations.com). She has written for print and online media since her high school days and majored in media studies. You can find her on Twitter at @bjungwirthNY.

Jackie Damrau, Editor

Books Reviewed in This Issue

The reviews provided here are those that are self-selected by the reviewers from a provided list of available titles over a specific date range. Want to become a book reviewer? Contact Dr. Jackie Damrau at jdamrau3@gmail.com for more information.

Head First Git: A Learner's Guide to Understanding Git from the Inside Out

Raju Gandhi. 2022. O'Reilly Media, Inc. [ISBN 978-1-492-09251-3. 470 pages, including index. US$69.99 (softcover).]

New technology often comes with its own set of buzzwords and lingo. If you are reading about technology or talking with software developers, there is a strong chance that you have already heard of Git, without ever hearing how to use it, or what it is used for. Many books are written as references answering questions such as, "How do you create a table of contents in MS Word?" You pick up the book, learn to do the one task, and then put the book down, possibly forgetting all the rest of the knowledge you may have picked up. Books like that are not meant to be read straight through. However, *Head First Git: A Learner's Guide to Understanding Git from the Inside Out* is not a simple reference guide; it is an all-inclusive workshop that is set up to teach you how to use Git.

First, Git is a free source control system commonly used to track and store files used when creating computer code. It creates a primary repository where you store files and track changes to them as you work on your code. It need not be solely computer code, as it can also be HTML, XML, and other text-based documentation. You can create a free account on GitHub to store your files in the cloud where you can even solicit feedback from others.

Next, *Head First Git* stands out above other reference guides in that it is really an easy-to-follow class for Git. It teaches all the basics, along with sophisticated concepts, and gradually builds up your confidence and knowledge through interactive exercises and activities. A website resource provides downloadable files that match each chapter of the book. Once you have these files, they sync up with each exercise, enabling you to experience firsthand how Git works with files, and so you do not have to create each exercise's content from scratch. The language is light, but serious, and strives to make sure that the reader is not just following along with the concepts but implementing them as well. Git is command line based, like LINUX, so using Git may have more of a learning curve than other source control systems. However, *Head First Git* strives to demystify the complexities of the application and build on prior knowledge learned.

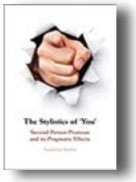
If you are interested in learning a tool that is widely used across the world, and would like to gain a firm understanding of source control systems for whatever files you are using, then pick up a copy of *Head First Git*. Grab a pencil, warm up your computer, and get ready to learn. This book is designed to be worked through interactively, not passively read from your recliner. While it can be used just for reference, *Head First Git* is designed to be your instructor in the world of Git. You'll want to "*git add*" it to your collection, and then "*git commit*" it to your home repository/bookshelf. Then, don't be afraid to "*git push*" it on your friends.

Timothy Esposito

Timothy Esposito is the Manager of Logistics Documentation at Oracle, an STC Fellow, the STC Vice President, and a past president of the STC Philadelphia Metro chapter with more than 20 years of technical communication experience.

The Stylistics of 'You': Second-Person Pronoun and Its Pragmatic Effects

Sandrine Sorlin. 2022. Cambridge University Press. [ISBN 978-1-108-83302-8. 254 pages, including index. US$110 (hardcover).]



Linguist Sandrine Sorlin astonished a colleague by announcing that she was writing an entire book on the second person pronoun. I, too, am surprised by the many ways she has parsed the second person point of view in *The Stylistics of 'You': Second-Person Pronoun and Its Pragmatic Effects*. Sorlin theorizes that the second person can be conveyed in text without necessarily using the word "you," yet the reader feels addressed by the writer. "The book explores how the reader imaginatively 'simulates' the narrator's thoughts and experience" (p. 230) without that specific pronoun. The exploration takes her readers "across genre, time and medium" (p. ix). Examples include fiction as well as nonfiction, 18th- to 21st-century writings, and print as well as digital texts.

The case studies in *The Stylistics of 'You'* exist along a continuum diagrammed by Sorlin in an early chapter, and to which she refers throughout the book. The author begins by setting out the "dynamic constellation" (p. 233) of ways the second person can be expressed in text that allows the reader to identify with the writer.

She hypothesizes that there are six ways to convey "you." Is the audience directly addressed as "you" in an ad campaign? Does the reader identify with the "first-person narrator hiding behind the second person" in a writer's journal (p. 58)? Is the reader of digital fiction addressed by a voice-over protagonist? Each of these possibilities falls within the continuum of "you" that runs from the first person (I or one) engaging the reader as the second person (You1) to a voice-over narrator speaking about and to a reader (You6). Examples illustrating one or more of the "you" numbers are analyzed in detail in each chapter. The author ends with an analysis of Kevin Spacey's YouTube video in which he uses the second person as a tool to manipulate his audience.

Besides demonstrating the possible versions of the second person, Sorlin's goal is to "help the reader better grasp the diversity of … effects the word can produce" (p. ix). By analyzing how the language brings the reader into the author's world, she maintains she is also gaining a perspective on the kind of empathy the language may engender. Her belief is that she is making a connection between linguistics and ethics that is not usually achieved.

Although *The Stylistics of 'You'* has its lighter moments, it is a dense text intended for an audience familiar with linguistic terminology. It requires careful reading, especially for anyone who does not know this vocabulary. Because it is surprising how the second person may be wrapped up in many guises, and because Sorlin has presented concepts a writer may find helpful in thinking about their relationship with their audience, it is a book that may well be worth diving into.

Linda M. Davis

Linda M. Davis is an independent communications practitioner in the Los Angeles area. She holds an MA in Communication Management and has specialized in strategic communication planning, publication management, writing, and editing for more than 25 years.

Principles of Web Design

Brian D. Miller. 2022. Allworth Press. [ISBN 978-1-62153-787-8. 268 pages, including index. US$35.00 (softcover).]

People have been browsing websites for over two decades, so it may seem elementary to require instruction on creating a quality website. However, once someone comes across a poorly designed site, not everyone is equipped to create usable, attractive web content. *Principles of Web Design* strives to guide the budding web developer on a path to success. While most web developers may want to just jump in and begin creating content, Brian D. Miller puts forth a three-level process for web design: Plan, Design, and Optimize.

Before any successful project can begin, a plan must be created. A site design should be mocked up, showing both the physical structure to the site's files, and a flow for intended users. Drill into details, like custom error messages to fit with your site's branding. Configure the visual layout of the site, including use of white space, fonts, and styles. Consider how it will look on a mobile device or tablet. Once you have these basics in place, you can begin to create the site itself. However, before you start adding content, you should consider site concepts such as menu navigation, headers and footer, and content that appears at the top of the page before you scroll. There are dozens of concepts to consider, ranging from colors to image animation. Finally, once the site is largely prepared, move into optimizing it. Design your content so it can be easily found by search engines, which is known as Search Engine Optimization (SEO). Set up tools to track who is using your site, and which pages get the most attention. Consider implementing an email campaign that ties into your website to increase visits to your site.

Throughout *Principles of Web Design*, Miller lays out each concept in a logical order and illustrates them all using sample websites. Even if you have never heard of SEO before, Miller provides a worthy overview, more than enough to get you started. While he may not tell you the exact colors or fonts to use on a site, Miller does give broad examples of what to look for when choosing such elements. Illustration is one area where he falls a little short. While the book is lavishly illustrated with screen captures from websites, flow diagrams, grids, and colors, sometimes the illustrations appear too small on

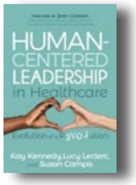
the page for any detailed scrutiny, perhaps obscuring the point of the image. Despite that one shortcoming, *Principles of Web Design* is a fine book to get you started on creating your own website masterpiece, laying it out, and getting visitors to eagerly return for information.

Timothy Esposito

Timothy Esposito is the Manager of Logistics Documentation at Oracle, an STC Fellow, the STC Vice President, and a past president of the STC Philadelphia Metro chapter with more than 20 years of technical communication experience.

Human-Centered Leadership in Healthcare: Evolution of a Revolution

Kay Kennedy, Lucy Leclerc, and Susan Campis. 2022. Morgan James Publishing. [ISBN 978-1-63195-553-2. 236 pages. US$18.95 (softcover).]



Nurses in a 21st century workforce encounter new and unique problems daily: complex technology, new medicines and treatments, and a constant pressure to meet higher standards with ever shrinking resources. Conquering these issues requires effective modern nursing leadership that meets a wider variety of needs than a traditional top-down style. Nurses Kay Kennedy, Lucy Leclerc, and Susan Campis assert that their new model of nursing leadership—the human-centered model—is up to the challenge.

"Human-Centered Leadership in Healthcare embodies the principles of complexity science. It [is] different from traditional leadership in that the leader is embedded in the system. The influencers and innovators are those at the point of care" (p. 1). These three authors provide evidence for their leadership theory with a compelling Institutional Review Board-approved clinical study that yielded qualitative results. Results included anecdotes and narratives, along with literature studies and historical perspectives. Although they provide the reader with a citation to investigate the research study further, the authors' study summary is somewhat limited. Improvements could include details that would make their conclusions more lucid; for example, the exact length of the study is omitted as well as details about the content of the focus groups. It is mentioned that they categorized the responses into a matrix and "coded" them, but this process is not explained thoroughly. Their arguments would be more compelling if more of the results were directly linked to the conclusions of their leadership model.

From this research study, the authors formulated their theory of leadership based on the idea that self-care, self-awareness, mindfulness, and emotional intelligence are all springboards upon which a leader embeds themself within a healthcare system. "Human-Centered Leaders require intentional development of skills that support the leader's effectiveness and the ability to create a sustainable culture of Excellence, Trust and Caring" (p. 131). The authors' outline the attributes of excellence as embodied by the Awakener: a motivator, coach, mentor, architect, and advocate (p. 131). They then list the characteristics of trust embodied by the Connector: collaborator, supporter, edge walker, engineer, and authentic communicator (p. 98). Concluding their leadership model by listing the components of caring embodied by the Upholder: mindful, others-oriented, emotionally aware, socially and organizationally aware, and personally well and healthy (p. 115). The authors' primary argument is that a truly effective leader in nursing must have all these skills, as well as the ability to discern when it is appropriate to emphasize one over another.

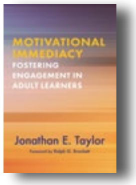
Overall, *Human-Centered Leadership in Healthcare: Evolution of a Revolution* is an excellent resource for nurses. However, the terms and language used assume the reader has experience in both healthcare and leadership. Including a quick-reference glossary with leadership terms and nursing acronyms would be helpful for someone new to both fields. Many skills described like reflective journaling, mindfulness, and appreciative inquiry are useful in developing leaders in other service professions aside from nursing. With this leadership model, Kennedy, Leclerc, and Campis have opened the door to their "evolution of a revolution."

Julie Kinyoun

Julie Kinyoun is an on-call chemistry instructor at various community colleges in Southern California. An avid reader, she enjoys reviewing books that help her become a better educator.

Motivational Immediacy: Fostering Engagement in Adult Learners

Jonathan E. Taylor. 2022. Stylus Publishing. [ISBN 978-1-62036-955-5. 190 pages, including index. US$35.00 (softcover).]



As an instructor, if you've encountered students with bland smiles and glazed eyes, you can assume they're not keenly interested in what you're teaching now. Well, this book may be for you. In *Motivational Immediacy: Fostering Engagement in Adult Learners*, Jonathan E. Taylor brings his experience in corporate training and higher education to the issue of learner motivation and engagement.

The author begins with the premise that all learners are motivated—either to learn or to avoid learning. This leads to the concept of learner resistance, a lack of engagement or openness to learning. Taylor distinguishes global (long-term) motivation to achieve goals like getting a degree or promotion from immediate motivation that keeps learners engaged at any given time. Motivational immediacy, he argues, is necessary for learning success, as "human learning is a moment-by-moment dynamic" (p. 46).

Educators need to keep a finger on the pulse of individual learners and try to connect students' lives to course content. Taylor stresses that learner resistance and affective aspects "need to be seen as the *driving force* of all learning….[T]eaching is more than getting someone to know something; it is getting someone to accept something" (p. 101). Consistent with his learner-centered approach, Taylor outlines a seven-step teaching model (Chapter 6), offers "four heretical rules for curriculum" (Chapter 7), and presents five rules of teaching (Chapters 1, 4, 8, and 9), which he applies to online and face-to face learning spaces.

The subtitle, *Fostering Engagement in Adult Learners*, might lead readers to believe this is a how-to book, but despite several examples, the balance tips in favor of theory. Taylor says, "[t]o employ practical methods in our classrooms effectively, we first must grasp the conceptual principles in which they are rooted." Fair warning because his extensive literature review reads somewhat like a doctoral dissertation. The author himself refers to the book as "a long and winding journey" that attempts to "travel all the way through the ideas to a point where the reader can see some practical way forward" (p. 158).

While practical nuggets provide an enjoyable counterbalance to theory, those who seek a book about fostering engagement would likely appreciate even more in the way of application and have the acumen to adapt examples to their own teaching situation.

Taylor's writing style is friendly and at times impassioned, as in his rant against designing curriculum around the ability to assess learning objectives: "[T]his bit of nonsense has sucked much of the soul out of the learning that issues from it…Measure what you can, teach what you must" (p. 161). At this point, teachers in the reading audience no doubt jump to their feet and cry, "Hear! Hear!"

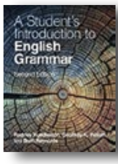
Teachers and trainers who wonder why well-planned lessons fall flat at times as well as anyone who wants a solid theoretical base in learner motivation and engagement will find valuable takeaways in *Motivational Immediacy: Fostering Engagement in Adult Learners*.

Bonnie Denmark

Bonnie Denmark is an STC Member and coordinates the Business/Technical Writing Option at Western Connecticut State University. She teaches undergraduate courses and mentors graduate students in their technical communication interest. Bonnie was previously a software developer and technical communicator, focusing on natural language applications, human interface, testing protocols, and health/science writing.

A Student's Introduction to English Grammar

Rodney Huddleston, Geoffrey K. Pullum, and Brett Reynolds. 2002. 2nd ed. Cambridge University Press. [ISBN 978-1-00-908801-5. 400 pages, including index. US$34.99 (softcover).]



A Student's Introduction to English Grammar is a new edition of Rodney Huddleston and Geoffrey Pullum's award-winning 2002 edition, *The Cambridge Grammar of the English Language*. In this second edition, the authors (including Brett Reynolds) explain why older authorities are mistaken in what they deemed to be "incorrect" grammar. Readers (primarily students at colleges and universities, but anyone who wants to get up to speed on modern English grammar) will find that this textbook is written in a conversational, easy-to-read style.

From the authors' perspective, principles of English grammar "have to be discovered through research, theory formation, and testing." However, advice on

English grammar tends to "repeat useless definitions formulated hundreds of years ago and propose baseless prohibitions and restrictions" (p. xi). *A Student's Introduction to English Grammar* presents an analysis of English grammar that accounts for newer discoveries in linguistic research.

Chapter 1 addresses general issues relating to written and spoken English, formal and informal style, and the structure of sentences. Chapter 2 provides a survey of the entire book and introduces concepts like word forms and lexemes, phrases and clauses, adjectives and adverbs, prepositions, adjuncts, and various constructions. The book's detailed content is in the remaining 14 chapters, including end-of-chapter exercises. Huddleston, Pullum, and Reynolds do not attempt to cover historical change, sociolinguistic variation, or the structure of non-standard dialects.

Each chapter thoroughly describes the concepts and provides extensive examples that are not repeated in the end-of-chapter exercises. Interestingly, or maybe frustratingly, an exercise answer key is not provided; the intention appears to be that instructors provide answers to students in the classroom.

To quote a review from the back cover of *A Student's Introduction to English Grammar*, Bryan Garner, Chief Editor at Black's Law Dictionary, said "Don't try to read it in one weekend. Pace yourself and read it, say, over the course of two months. Soon you'll be regaling your friends with accounts of subject extraposition, pseudo-clefts and bare existentials. If you're not the life of the party, then you're attending the wrong parties." It's good advice; pace yourself. And whether you intend to store all that knowledge in your brain or share it at parties, you will be well-versed in modern sentence structure in the English language.

Michelle Gardner

Michelle Gardner is a contracted senior writer at Microsoft focused on their cloud portfolio. She has a bachelor's degree in Journalism: Public Relations from California State University, Long Beach, and a master's degree in Computer Resources and Information Management from Webster University.

The Cambridge Guide to Reading Poetry

Andrew Hodgson. 2022. Cambridge University Press. [ISBN 978-1-108-82412-5. 256 pages. US$19.99 (softcover).]

In *The Cambridge Guide to Reading Poetry*, Andrew Hodgson provides an illuminating guide for how to read and engage with poetry closely and intensely, using many examples from diverse eras and geographical areas of poetry written in English to illustrate his arguments. The book is not a simple how-to guide—rather, what Hodgson presents here is a comprehensive way of understanding poetry through the perspective of a knowledgeable, articulate guide. The author argues that "Poetry pays and communicates precise attention to experience, and part of the value of reading poems is that it trains us to pay similarly precise attention" (p. 48). Throughout, he achieves this "precise attention to experience" to the reading of poetry that he argues is one of poetry's defining features.

This book has three main sections. The first, "Reading a Poem," is the central part of the text at 190 pages. This section is broken up into subsections of questions, such as "What Is the Poem about?," "How Do the Lines Move?," "Does the Poem Rhyme?," and "Who Is Speaking?" These questions are misleadingly simple. Through them, Hodgson illuminates how different poets use these features of poetry in their craft to divergent effects, leading the reader to an in-depth way of understanding these elemental concerns of poetry from myriad styles of poetry. The second section, "Studying a Poet," shows the reader how to delve deeply into the oeuvre of a poet through reading their poems, biographies, and criticisms about them. To illustrate this, Hodgson uses an older poet, Emily Bronte, and a contemporary poet, Srinivas Rayaprol, to show the different factors involved in research depending on how much information about the poet is available. The third section, "Writing about Poetry," provides a guide most useful to undergraduate students for how to write close-reading and argumentative seminar papers using the skills and insights gained from the first two sections.

Hodgson intends this guide "for students from high school upward and for the general reader," though the immense detail in each subsection of the first part will likely prevent all but the most serious of high-school and general readers from delving into and completing

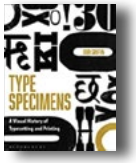
this book (p. 1). The book's language is accessible, lucid, and direct, rarely dipping into undefined poetic jargon. As such, *The Cambridge Guide to Reading Poetry* would be useful for technical communicators looking to reintroduce themselves to the act of reading poetry critically, or even those looking for a way to write a guide for difficult and diffuse subjects with clarity.

Dylan Schrader

Dylan Schrader is a proposal developer at the University of Alabama in Huntsville, where he also earned MAs in English and Professional Communication.

Type Specimens: A Visual History of Typesetting and Printing

Dori Griffin. 2022. Bloomsbury Visual Arts. [ISBN 978-1-350116-59-7. 256 pages. US$34.95 (softcover).]



For a while now, design educators and historians have been calling for a broadening of the design canon, and for investigations into design history that create room for a more diverse expression of that history. While there is no one solution to this problem, Dori Griffin's new book, *Type Specimens: A Visual History of Typesetting and Printing*, is a great example of how this can be done. The introduction lays out the goals of for the reader, including expanding access to design history and designed artifacts, providing historical context around artifacts, diverse global references and resources, and to present as many images as possible to serve as references for visual thinkers.

Griffin acknowledges the difficulties in using type specimens to create a diverse and global history of design, due to the history of printing's ties to settler colonialism and cultural imperialism. Despite this problematic connection, the issue is well managed by including diverse specimens from around the globe, but also by including the context in which they were created. This context is essential to understand the purpose for type specimens in Syria or China, which were in large part initially created from a western perspective and used to convert the local people to Christianity. Griffin does not shy away from revealing this history's colonial past.

Though not a large book, it is well designed with abundant examples of typographic specimens from around the world, supporting the goal of presenting a globally diverse history. This also works to expand access for readers without access to archives, while also providing numerous images for visual reference. The approach is simple but beautiful, the only complaint would be that the images are often quite small, making it hard to thoroughly examine the specimens, an oversized coffee table book might be needed.

The history in *Types Specimens* also approaches the issue of context by examining the close relationship of the design of specimens and the evolution of their purpose through the changes in printing technology. Technological advances described in the book fundamentally change the approach to how specimens are used to promote type and the technology they are created for. As the technology progresses, earlier technology competes with newer technology to maintain relevancy. The final chapter, on digital type, reveals the success of digitization and forward progression, in which more people from diverse backgrounds are not only able to access type, but also to create type that serves their needs—not the needs seen from a westernized perspective.

Type Specimens is a relatively short history at only 250 pages. Yet, it is so full of information and well-defined terms, and provides excellent examples that support the content. It also presents more obscure histories including the processes of tintyping and electrotyping.

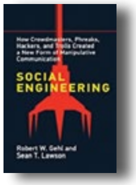
This book will appeal to design educators who are looking for more expansive histories of graphic design and visual communication, as well as designers and design students who are interested in expanding their knowledge of design history and its practice.

Amanda Horton

Amanda Horton holds an MFA in Design and currently teaches graduate and undergraduate courses at the University of Central Oklahoma (UCO) in the areas of design history, theory, and criticism. She is also the director of the Design History Minor at UCO.

Social Engineering: How Crowdmasters, Phreaks, Hackers, and Trolls Created a New Form of Manipulative Communication

Robert W. Gehl and Sean T Lawson. 2022. The MIT Press. [ISBN 978-0-262-54345-3. 344 pages, including index. US$28.00 (softcover).]



In the wake of the 2016 election, many have come to realize that we have entered an unprecedented era of manipulative communication. Con-artists, often hiding behind false personas, and acting on behalf of hidden actors, have learned to flood social media with disinformation, divisive memes, and snarky attacks aimed at election meddling and sowing social discord. Manipulative communication—advertising and propaganda—have long existed, but the affordances of social media, seem to have put manipulation on steroids. How did this mess develop and what can be done about it?

The authors of *Social Engineering: How Crowdmasters, Phreaks, Hackers, and Trolls Created a New Form of Manipulative Communication* attempt to answer both questions, first by giving the new form a name—masspersonal social engineering—and then by tracing its lineage.

As they tell it, masspersonal social engineering is a mashup of two earlier manipulation technologies, each developed to exploit the affordances of earlier communication technologies, first the advent of mass media—broadcast and print—and later, the expansion of the phone system.

Exploiting the newly available mass media, the early pioneers of advertising and public relations developed several now familiar manipulative techniques—publicity stunts, specious claims, fake front groups, celebrity endorsements—aimed to sway a mass audience.

Later, the widespread expansion of the telephone system saw the rise of an early tribe of hackers called Phone Phreaks. Hacking the phone system often required conning phone company employees into giving out privileged information and access. The Phreaks soon developed and honed a system of interpersonal con-artistry they proudly called "social engineering."

Stated briefly, but fully described in the book, the techniques were trashing, pretexting, bullshitting, and penetrating. Taken together, they involved researching targets by sifting through clues they left behind, creating a false but convincing persona and reason for contact, then using a friendly mix of truth and bullshit to con the targets into doing things they would not otherwise do. While interpersonal social engineering worked, it was labor intensive, taking many attempts to achieve success.

The authors argue that social media has allowed the techniques of mass and interpersonal social engineering to meld and grow in reach and ease of use. With its vast troves of personal data, its algorithms and sorting capabilities, and its high tolerance for fake accounts, social media does much of the con-artist's work for them, making it vastly easier to reach likely targets with the right bullshit message to influence how they believe and act.

Stepping back, the authors discuss contextual issues surrounding the use of masspersonal techniques and suggest ways to ameliorate their use by addressing their constituent elements.

Social Engineering provides an interesting and informed analyses and is well worth the read for anyone attempting to better understand the often-baffling ways in which contemporary public opinion is being shaped.

Patrick Lufkin

Patrick Lufkin is an STC Fellow with experience in computer documentation, newsletter production, and public relations. He reads widely in science, history, and current affairs, as well as on writing and editing. He chairs the Gordon Scholarship for technical communication and co-chairs the Northern California technical communication competition.

How to Take Over the World: Practical Schemes and Scientific Solutions for the Aspiring Supervillain

Ryan North. 2022. Riverhead Books. [ISBN 978-0-593-19201-6. 416 pages, including index. US$28.00 (hardcover).]

There are many "how to" books available on about every topic imaginable: cooking, gardening, painting, software use, etc. The format is so useful that a "how to" document is a technical communication staple. However, humorist Ryan North takes on the greatest challenge of this genre and documents *How to Take Over the World: Practical Schemes and Scientific Solutions for the Aspiring Supervillain*.

Within this handbook are hidden gems of wisdom that any aspiring evil villain would need to see their schemes come to fruition. At first, the book appears to be purely whimsical featuring topics such as where to build your evil lair and how to clone dinosaurs for your evil army to ride. Although these tropes are common in James Bond movies and comic books, what North's book does is examine what it would take to use these plot devices in the real world. As an aspiring villain, what would it take to run a self-sufficient evil lair? Building in a volcano is too impractical while flying in an airship is not fuel efficient. After explaining research based on actual science, the lair must contain a certain number of farmable acres run by a certain number of minions to be viable, for example. Additionally, it must be located on land that is not controlled by a government, of which it turns out there are a few locations, such as Bir Tawil on the border of Egypt and Sudan. If creating your own country is not good enough, you can rule an existing one through voter fraud and creating computer viruses, both of which are explained conceptually. Throughout the book are interesting sidebars such as Wikipedia hoaxes (an imaginary Egyptian scholar named "Sheikh Urbuti" was the longest-undiscovered hoax) and informative and clever illustrations. Combined with North's wry humor, the instructions and thoughts are written so that even a villain of the sternest disposition will crack both a smile and an aspiring hero's head, while learn something new at the same time.

While *How to Take Over the World* will not really teach you how to achieve global domination, it will provide you with a humorous light science discussion of the general principals. For example, it looks like the world is not yet able to viably clone dinosaurs, but with current technology you can create a spacecraft that will transport your remains and a history of your villainous deeds millions of years through space. Do not wait to see your plans fail at the hands of do-gooders; rush to (legally) obtain *How to Take Over the World* so you will succeed in your machinations to exert absolute control over, at the very least, your armchair.

Timothy Esposito

Timothy Esposito is an STC Fellow, current STC Vice President, and past president of the STC Philadelphia Metro chapter. He is the Manager of Logistics Documentation at Oracle with more than 20 years of technical communication experience.

Embodied Environmental Risk in Technical Communication: Problems and Solutions Toward Social Sustainability

Samuel Stinson and Mary Le Rouge, eds. 2022. Taylor & Francis. [ISBN 978-1-0321-5549-4. 290 pages. US$44.95 (softcover).]

If you are a practitioner or teacher working in the field of technical communication, environmental education, science communication, or public health, the material in *Embodied Environmental Risk in Technical Communication: Problems and Solutions Toward Social Sustainability* will give you a valuable perspective and great food for thought. Editors Samuel Stinson and Mary Le Rouge provide a collection meant as stated on the book's back cover, "to provide an understanding of environmental risk that promotes social justice." The editors consider how to improve technical communication through this understanding of environmental risk while promoting social justice. They organized the collection effectively into three groups:

- Representations of the Human Body
- Representations of the Earth's Body
- Representations of Human Beings and Earth Together

As a reader might expect from a risk communication book, the material in the Representations of the Human Body section deals with communication about the risks related to COVID-19 with one piece about how to communicate more effectively via email with college students on this topic.

In the Representations of the Earth's Body section, one piece is about communication regarding the risks—such as pollution—for the Ohio River. Issues raised include which organization defines the risk, as typically it is the Environmental Protection Agency (EPA) (p. 115). We can also look at how a regulatory agency defines risk in contrast to a non-profit. We can look at an example of risk communication from the

EPA's Great Lakes Initiative in explaining issues such as the risks associated with toxic algae blooms. We can ask—which groups best define and communicate risk—is it a governmental agency such as the EPA or a local non-profit with volunteers? This is an example of the issues raised in this section of *Embodied Environmental Risk in Technical Communication*.

Jeanette Evans

Jeanette Evans is an STC Associate Fellow; active in the Ohio STC community, currently serving on the newsletter committee; and co-author of an *Intercom* column on emerging technologies in education. She holds an MS in technical communication management from Mercer University and undergraduate degree in education.

Save Me! (From Myself): The Existential Crises of a Creative Introvert

So Lazo. 2022. Chronicle Books LLC. [ISBN 978-1-7972-0341-6. 128 pages. US$14.95 (hardcover).]

Save Me! (From Myself): The Existential Crises of a Creative Introvert by So Lazo, an author and illustrator from El Salvador, is full of the author's signature artistic style which they describe as "a combination of magic, vibrant colors, emotions, gender identity, and cuteness" (https://www.queef.be/solazo). From cover to cover, each page offers vivid illustrations that convey relatable emotions and experiences such as imposter syndrome, unrequited love, and more.

Lazo starts this book with a letter to the reader in which they declare, "This book is extremely personal; it's my diary, it's hope, it's heartbreak, it's revenge, it's life, it's raw." The honesty and depth of these illustrations are what make this book so compelling. One of my favorite illustrations depicts the reality of social anxiety with a touch of deprecating humor, which I deeply relate to. It's labeled "me flirting" and offers six panels in which one person—presumably "me"—notices another, stares, looks away when the other person looks at them, continues staring, then the other person leaves, and the last frame is the person's immediate reaction of "OK, guess I'll die alone." *Save Me! (From Myself)* illustrates complex emotions and experiences. Chances are that you'll find at least one illustration that you relate to as well.

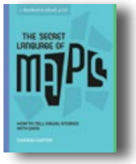
Besides *Save Me! (From Myself)*, Lazo has another book titled, *Witch, Please: Magical Musings on Life, Love, and Owning Your Power*, which is a book of illustrations that "celebrates the power and diversity of contemporary witches in this enchanting love letter to all things occult" (https://www.chroniclebooks.com/products/witch-please). If you're a fan of Lazo's style, you can also check out their personal brand which features clothes and other products featuring their illustrations.

Sara Buchanan

Sara Buchanan works at LCS, a property management software company, in Cincinnati, OH. In her free time, she's an avid reader, enjoys cooking, and doting on her cats: Buffy and Spike.

The Secret Language of Maps: How to Tell Visual Stories with Data

Carissa Carter. 2022. Ten Speed Press. [ISBN 978-1-9848-5800-9. 172 pages, including index. US$14.99 (softcover).]



Most people have at least a limited experience with maps, whether it is from an app on their phone, a navigation system in their car, or a giant misfolded piece of paper from AAA. However, understanding the art and science that goes into creating a map is a topic which many do not stop to consider. In *The Secret Language of Maps: How to Tell Visual Stories with Data*, Carissa Carter attempts to explain how maps convey content in a visual manner.

While you might expect a book on maps to begin with basics, such as map scale, orientation, the map legend, or the type of map, Carter uses the structure of a missing persons case to drive the explanation of maps of all types. In the context of *The Secret Language of Maps*, the maps are not just geographical, but illustrations of data. However, to help ease into the concept of mapping data, the first several chapters are a story of a fictional murder mystery. Once the stage is set and some illustrated clues are given to the protagonist, the book shifts into a lecture format describing the clues and how they are different forms of data maps. As the book progresses, the chapters switch between narrative and instructional, always building on one another. For example, Carter analyzes the clues in the mystery to determine what type of data they are and how they

correlate with other unrelated data. Various tools are used ranging from Venn diagrams to bar charts to timelines. Consequently, the book contains illustrations, charts, colors, logic flows, a gatefold to hold the larger concepts, and of course, maps. Even the book's mystery section appears within an illustrated manila envelope holding the case files.

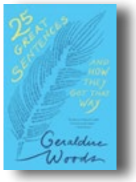
If you enjoy analyzing and visualizing data and want to learn underlying concepts behind creating various data maps while solving mysteries, then *The Secret Language of Maps* is the book for you. Similarly, if you enjoy solving mysteries, then this book can help with your data analysis. The light style of writing, the wonderful illustrations and use of color, and the size of the book make it an appealing source to add to your book collection. However, based on the data analysis skills Carter teaches, it is not recommended that you assume a life of crime, so please refrain from creating your own true life murder mystery situations after reading this book.

Timothy Esposito

Timothy Esposito is an STC Fellow, current STC Vice President, and past president of the STC Philadelphia Metro chapter. He is the Manager of Logistics Documentation at Oracle with more than 20 years of technical communication experience.

25 Great Sentences and How They Got That Way

Geraldine Woods. 2020. W.W. Norton & Company. [ISBN 978-0-393-88237-7. 316 pages, including index. US $17.95 (softcover).]



Geraldine Woods is an author of adult and children's books, with extensive experience teaching English. Woods mentioned that she enjoyed writing *25 Great Sentences and How They Got That Way* and her passion for the English language is apparent. This book is intended for people who are avid readers and have an enthusiasm for masterful writing—and an appreciation of the effort to create it.

As the book's title states, Woods has written twenty-five chapters where she performs an in-depth analysis of one sentence that she believes, "… exemplifies a distinct element of style" (p. xvi). She also includes additional sentences "…that illustrate the same technique or variations of it" (p. xvi). Although Woods used grammatical and rhetorical techniques in her analysis, she purposely avoids including the terms in the book, unless needed. Therefore, readers of all levels benefit from her insightful, jargon-free analysis.

Woods organized the chapters under five groupings that cover structure, diction, sound, connection/comparison, and extreme creativity, which she defines as "…sentences that stretch the limits of conventional expression…" (p. xvi).

Her comprehensive research and eclectic selection of examples is a large part of the appeal in *25 Great Sentences*. Readers are treated to the familiar, such as writing that has influenced our culture (a sentence from Yoda, a popular *Star Wars* character on page 42) and our society (a sentence from Martin Luther King, Jr.'s "Letter from a Birmingham Jail" on page 233) to discovery of writers or artists that may be new to them.

Woods also encourages her readers to practice the techniques she analyzes via her "For the Writer" section located at the end of each chapter. The creative, well-designed exercises reflect her education background.

Lastly, *25 Great Sentences* includes a helpful "Index of Authors and Sentence Sources" for people who would like to read a cited author's complete work or explore new artists and writers.

Ann Marie Queeney

Ann Marie Queeney is an STC senior member with more than 20 years' experience in the medical device industry. Her STC experience includes serving as a 2020-2022 Board member and Communities Affairs Committee Chair, special interest group leader, and STC Education Committee member. Ann Marie is the owner of A.M. Queeney, LLC.

Our Plastic Problem and How to Solve It

Sarah J. Morath. 2022. Cambridge University Press. [ISBN 978-1-108-79537-1. 202 pages, including index. US$24.99 (softcover).]

It is important to not let the book's title mislead you into thinking you will find concrete solutions that will eliminate our global plastic problem. Instead, *Our Plastic Problem and How to Solve It* is a book that helps readers "understand the complexity of plastic pollution," and the need for an interdisciplinary and "multimodal approach to solving this problem" (p. 2). In other words, the work to solve the plastic problem still needs to be done; this book,

however, will help readers understand what that work involves.

Morath divides the book into three sections: 1) Plastic in the Environment, which provides background information about how pervasive and detrimental this problem is; 2) Multimodal Approaches to Solving Our Plastic Problem, which details effective and ineffective federal, state, local, international, and other efforts to curb plastic pollution; and 3) Innovation and Design, which provides information on the recycling process and what it means to move toward a circular economy.

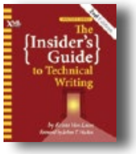
For a subject that includes complex statistics and scientific material, Morath makes the information easy to read and follow, and part of what makes the writing successful is the chapter structure. Each chapter opens with an introduction that directly states what will be covered in that chapter, why it is important to the overall conversation about plastic pollution, and what readers can expect to know by the end of the chapter. Chapter summaries are also included, which provide a thorough overview of main ideas. The writing itself is not pretentious or overly scientific; however, Morath does not shy away from explaining essential, but complex, terminology. Clear, direct definitions are always provided, so readers with little knowledge about the various subjects covered in the book will not be lost or in over their heads.

Based on the title, I admit that I expected to be told exactly what to do at all levels of society to eliminate plastic pollution and prevent further proliferation of unrecyclable plastics, but *Our Plastic Problem and How to Solve It* is like many other books on this subject in that it simply recounts what causes the problem, what has been done (or not done) to help clean up or curb the problem, and what still needs to be done. The book's goal, as stated earlier, is simply to inform readers about the extent and severity of the problem. Solutions are still up in the air; however, Morath does provide helpful information that readers can consider when making consumer decisions and understand what is happening at political and legal levels when it comes to environmental matters, especially those associated with plastics. To read this book as a solo venture may not leave you feeling particularly empowered, but if this book were used in a book club or for a class that includes social advocacy, where conversation—and maybe even environmental advocacy can take place—well, there might be a more practical and personally satisfying outcome.

Diane Martinez
Diane Martinez is an STC member and an associate professor of English at Western Carolina University where she teaches technical and professional writing. She previously worked as a technical writer in engineering, an online writing instructor, and an online writing center specialist.

The Insider's Guide to Technical Writing

Krista Van Laan. 2022. 2nd ed. XML Press [ISBN 978-1-937434-78-6. 352 pages, including index. US$35.95 (softcover).]



If you have been repeatedly asked, what does it take to become a technical writer or what book should someone read on the subject, you will appreciate having Krista Van Laan's *The Insider's Guide to Technical Writing, 2nd ed.* to recommend. In this new edition, JoAnn T. Hackos in the Foreword emphasizes features including: What managers expect today; what to put in a Techwriter's Toolkit; and how technical writing can create successful users who become loyal customers.

Have you read job ads recently? There can be long lists of technical tools that seem to be in high demand, but here are some common skills a hiring manager looks for:

Hit the Ground Running: With the fast pace of industry, one trait that all technical writers need is the ability to hit the ground running. More than just being familiar with computer software, we need to learn quickly about or already know the company's products.

Logical Mindset: This type of person is left-brain dominant with skills in verbal analytic, abstract, and logical activities. We can think and organize clearly but may come up short in the hand-eye coordination of the right-brain subject matter expert tester or engineer.

Ability to communicate with potential users of the company's products: Keep someone you know personally in mind when writing documentation. Early in my career, I wrote for parents who were skilled laborers in a factory. If they could understand, then I had reached my target audience. Another typical customer may be someone familiar with written documents but whose company needs to switch to digital formats.

Other important technical writing topics discussed in this second edition is:

Tool Knowledge, Chapter 12. For your convenience there is also a condensed list of tool needs on page 31. Years ago, a tech writer did not have to write for the web; it was all paper deliverables. Nowadays, you might even need to work with voice-over talent to create social media and training materials.

Agile Process, Chapter 9. This popular development process is based on across the company teamwork and open communication. Team members keep current by attending regular meetings. Before Agile, individual technical writers could be hard-pressed to know the latest developments or be prepared to meet unexpected deadlines.

Outline Skills, Chapter 15. The beginning technical writer may find this chapter the most useful. You will be able to grasp the tasks expected and the order to complete them in. The outline serves as the first draft for review by team members. An outline is also useful to group content. Feel free to incorporate existing company documentation; this is not plagiarism.

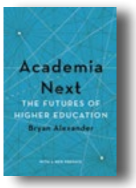
Each of us in our lifetime has been a customer who tried a new product and needed instructions to assemble or operate it properly. So, the absolute best thing about the technical communication profession for me is that anyone willing to apply themselves can make a good living as a technical communicator. Not every reporter, magazine article writer, novelist/fiction writer can truthfully claim that.

Donna Ford

Donna Ford has been an STC member and a technical writer in the hardware, software, IT, and government healthcare industries. She holds an Information Design certificate from Bentley College. Donna is an author who also reviews trade books online for the US Review of Books.

Academia Next: The Future of Higher Education

Bryan Alexander. 2020. Johns Hopkins University Press. [ISBN 987-1-4214-4326-3. 352 pages, including index. US$27.95 (softcover).]



I sincerely suggest that you take an inordinately deep breath and find an agreeable chair before opening Bryan Alexander's very deep dive into the unpredictable evolution explored in his seminal volume *Academia Next: The Future of Higher Education*. Quippy chapter titles not withstanding (Chapter 12: Siri, Tutor Me for example), the author pulls no punches in this epic work. The preface that drives home the challenging premise that "academia" is, like an amorphous entity, more than ever incurably entangled within the larger cultural context and all the emerging dystopia engendered therein. In his eyes, the Ivory Tower has become University Inc.

The simple fact that there are 83 pages (25% of the book) of reputable notes in the addendum should, in and of itself, be an adequate omen of the approaching gauntlet. Alexander asserts that higher education, currently in transition, is perilously ensnared with the pandemic, anti-racism activism, climate change, declining birth rates in developed nations, sexual assault, library declines, "adjunctification" loss of tenure, decline of the humanities, increased demand for grant funding and the marketable patents hopefully generated, student debt, wealth inequality, and on it goes (p. 37).

The only arenas which still hold ground amidst this capitalization of classical academia are the increase in both the number and compensation of administrators along with that antitheism to academia, sports. Universities are now, because of significant cultural changes during recent decades, businesses, and major ones at that. This is nicely summarized in the Higher Education Crisis Graph and is not a complimentary characterization (p. 21).

In the first half of *Academia Next*, the author deals specifically with many of the trends briefly outlined in the lengthy preface. He includes perhaps an excess of background data for many of his assertions which does lead to a tedious, albeit detailed, read.

The latter half of the volume, "Scenarios" turns a more speculative eye on the possible futures of the yet to be academia of tomorrow. While the success rate of futurists in general is rather spotty, the author is none the less diligent in his efforts to conceptualize prospective constructs that are rooted in current trends. After all, who could have predicted what the COVID-19 pandemic would do to in-class attendance levels.

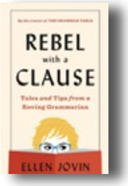
I have barely touched upon the full list of related, influential forces driving today's educational institutions, large and small, the educational caste system, entrance biases, disparities in secondary educational resources, the ascendancy of international educational markets, etc. Alexander takes issue with

these and many other topics in *Academia Next.* It's a dense, highly referenced volume that should be a must read for anyone involved in our educational system.

Lynne Cooke
Lynne Cooke is a Clinical Assistant Professor at Arizona State University (ASU) where she teaches courses on usability, digital media, and portfolio development. She is also an STC member of the Arizona Chapter and the ASU Internship Coordinator.

Rebel with a Clause: Tales and Tips from a Roving Grammarian

Ellen Jovin. Mariner Books. [ISBN 978-0-358-27815-3. 400 pages, including index. US$24.00 (softcover).]



It's not unusual to have a whimsical idea you want to put into action. For example, maybe you dream of traveling to all 50 states and collecting a postcard or a shot glass from each one. In *Rebel with a Clause: Tales and Tips from a Roving Grammarian*, Ellen Jovin did set out to visit all 50 states (she and her husband got to 47 of them before the pandemic hit), find spots with the best grammar traffic, and provide comfort to anyone distraught about grammar.

The journey started in September 2018 when Jovin—who studied 25 languages (for fun!) and taught grammar and writing for decades—carried a folding table and a descriptive sign to the northern entrance of the Seventy-Second Street subway station in New York. She soon moved on to other locations around town. Within six months, she took the Grammar Table across state lines and now we have this book that chronicles some of her adventures.

Jovin said upfront that this was not a Grammar Judgement table. Some of her visitors had experiences with people who made them feel bad about their use of language, and Jovin recognized that language is connected to a person's sense of self and power. This especially applied to visitors who didn't speak English natively. Conversations spanned vernaculars—Arabic, Dutch, German, Hebrew, Indonesian, Polish, Tagalog, and several others. Her visitors were diverse, but what bound everyone together was language.

Each chapter of *Rebel with a Clause* addresses a specific grammar topic—starting with the Oxford comma and immediately transitioning to grammar vocabulary (interjections, linking verbs, prepositional phrases, and the like). This book would feel incomplete if it didn't address *affect* and *effect*, *farther* and *further*, and *lay* and *lie*; plus, you get to read about adverbial antics, peripatetic past participles, gerund-present participles, and texting grammar.

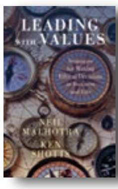
Jovin's husband filmed many of the Grammar Table encounters and Jovin edited the dialogue from those recordings for clarity, length, and coherence to write this book. There are more than a few times where there seemed to be too much editing and the encounters end abruptly, but maybe you had to be there to appreciate the humor or impact of a particular situation. More importantly, the grammar questions were legitimate concerns for people to which Jovin provided answers that resolved the issues and sent people away with definitive answers.

For anyone interested in a lighthearted look at how words and punctuation are used to communicate at work, at home, among friends, and among colleagues, *Rebel with a Clause* is an easy read that provides insights and laughs along the way.

Michelle Gardner
Michelle Gardner is a contracted senior writer at Microsoft focused on their cloud portfolio. She has a bachelor's degree in Journalism: Public Relations from California State University, Long Beach, and a master's degree in Computer Resources and Information Management from Webster University.

Leading with Values: Strategies for Making Ethical Decisions in Business and Life

Neil Malhotra and Ken Shotts. 2022. Cambridge University Press. [ISBN 978-1-108-84419-1. 182 pages, including index. US$39.99 (hardcover).]



How should business leaders incorporate values in their decision making? A first step is to acknowledge that no decision, and no organization, exists outside the values of the "broader political and social environment" (p. 8). It follows that if corporations "do not exist independently of society" (p. 85), and "government doesn't do such a great job of policy making" (p. 81), "companies have a responsibility to actively support inclusive and democratic institutions" (p. 92). A corporate leader must make decisions within a broad range of values: not

only his own or those of shareholders, but also of "employees, customers, suppliers, communities" (p. 85), and "the foundational institutions of society" (p. 92).

To achieve this goal, leaders must recognize that organizational culture primarily determines ethical behavior. As leaders, they must model that culture; "determine which policies are consistent with. . . [their own] core values" (p. 137); and "authentically communicate those values—and resultant policies—to stakeholders" (p. 137). In addition, corporate leaders must also integrate their own personal ethics within the broader organizational, socio-political, and cultural values represented by the company.

Several methods and strategies, drawn from various schools of philosophy, help leaders realize and implement their core values in ways consistent with the ethical demands of their broad constituency. These include analyses of consequentialism and utilitarianism (prioritizing the greater good over the individual); perspective-taking (applying the Golden Rule); Kant's categorical imperative (if it's wrong in any circumstance, it's wrong in this circumstance); and ends versus means reasoning (using people as tools or objects to achieve goals). Underlying all is the principle of justice "ultimately grounded in strong notions of fairness" (p. 137).

Case studies include Theranos taking the "Silicon Valley culture of 'fake it till you make it' to an extreme" (p. 46); Steve Jobs motivating his employees with values like "Think different" while colluding with other companies "to hold down wages of engineers" (p. 2); and Juul marketing addictive e-cigarettes with flavors attractive to minors (pp. 105–107). In each case, the ends were used to justify the means. Toyota, in contrast, rehabilitated a dysfunctional General Motors plant by "managing difficult tradeoffs" (p. 7) among opposing constituencies.

No single strategy works every time, and the morality of a decision inevitably requires weighing the often-contradictory demands of stakeholders against each other. And whatever combination of ethical approaches leaders may take, they must ultimately balance their personal values against "the importance" they "place on individuals vs. overall consequences" (p. 120). Leaders may wish otherwise, but "there are no easy answers"—the buck stops with them (p. 128).

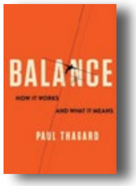
Neil Malhotra and Ken Shotts' book, *Leading With Values: Strategies for Making Ethical Decisions in Business and Life*, stems from their experience teaching Stanford MBA students. Each chapter includes sections on "Takeaways," "Suggestions for Further Reading," and "Reflective Exercises" to stimulate further thought. In all, this book is a concise, usable, and balanced guide to making ethical decisions in business.

Donald R. Riccomini

Donald R. Riccomini is an STC member and Emeritus Senior Lecturer in English at Santa Clara University, where he specialized in engineering and technical communications. He previously spent twenty-three years in high technology as a technical writer, engineer, and manager in semiconductors, instrumentation, and server development.

Balance: How It Works and What It Means

Paul Thagard. 2022. Columbia University Press. [ISBN 978-0-231-20558-0. 336 pages, including index. US$32.00 (hardcover).]



A laboratory balance is a simple, one-dimensional instrument dating back to ancient science. In its earliest form, the apparatus achieved balance with equal masses on both sides—adding mass to either side tipped it out of balance. Paul Thagard elaborates in his book *Balance: How It Works and What It Means*, that although the topic of balance dates to this ancient apparatus, it expands into immensely rich, multidimensional areas. In his book, the author first explains scientifically what balance is from a biological and medical perspective and then shifts into an evaluation of balance metaphors that help us fill in the gaps of our scientific knowledge—and whether these metaphors are strong, bogus, or even toxic to culture.

Inspired by Thagard's own bout of vertigo, the first four chapters explain the science behind human balance and some of the common conditions that result as a breakdown of the mechanisms. He continues to use his personal experience with vertigo as an example, or the "experience of illusory motion: something seems to be moving even though it is not" (p. 42). This balance malfunction usually includes a mismatch of signals from all the neurological functions involved—the inner ear canals, vision, and hair cells send information to the brain—when vertigo occurs these signals do not match, thus creating a spinning sensation.

In the section linking balance to feelings, Thagard applies his balance mechanisms to the expanding field of mind and body, or the origins of consciousness. "My . . . theory explains why balance is usually unconscious but enters consciousness when problems arise. Unlike (other theories) my theory also explains why different imbalance experiences such as vertigo and nausea come with different feelings" (p. 105).

In chapter 5, *Balance* shifts to an explanation of metaphor and its role in understanding balance. Thagard states that literal mechanisms only explain basic biological and medical applications of balance, yet it is much richer than that. "But balance concepts flourish in other areas of human thought, including science (chemical equilibrium), medicine (balanced diet), psychology (stable personality), art (balanced composition), and philosophy (reflective equilibrium)" (p. 106).

In this lengthy analysis covering many subjects regarding balance, Thagard again references vertigo. Most notably in his analysis of the film *Vertigo* starring James Stewart and Kim Novak. His observation, "Hitchcock largely flubbed the science of vertigo, but he powerfully portrayed the balance disorder of dizziness triggered by heights. Just as effectively, he presented metaphorical vertigo provoked by uncertainty in romantic relationships and especially by astonishing events that have no explanation" (p. 232).

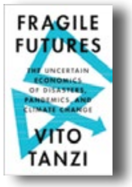
In conclusion, the author's analysis of balance in philosophy challenges the assumption that being out of balance is not entirely negative—the idea of metabalance. This implies that "leading a meaningful life requires finding a balance between balance and imbalance" (p. 269). Thagard concludes by suggesting that a satisfying life requires an element of both.

Julie Kinyoun

Julie Kinyoun is an on-call chemistry instructor at various community colleges in Southern California. An avid reader, she enjoys reviewing books that help her become a better educator.

Fragile Futures: The Uncertain Economics of Disasters, Pandemics, and Climate Change

Vito Tanzi. 2022. Cambridge University Press. [ISBN-13 978-1-009-10012-0. 246 pages, including index. US$24.99 (hardcover).]



How can governments prepare for unpredictable events such as a pandemic or climate change? That is one of the questions raised by economics professor Vito Tanzi that he also addresses in *Fragile Futures: The Uncertain Economics of Disasters, Pandemics, and Climate Change*, which is an idea from economist John Maynard Keynes about the distinction between predictable and unpredictable events and how governments only prepare for predictable events. The author argues that governments have not in the past prepared for unpredictable events, such as a pandemic or climate change, and proposes that if there is to be human progress in a future world, governments should look at a more global government role to deal with unpredictable disasters.

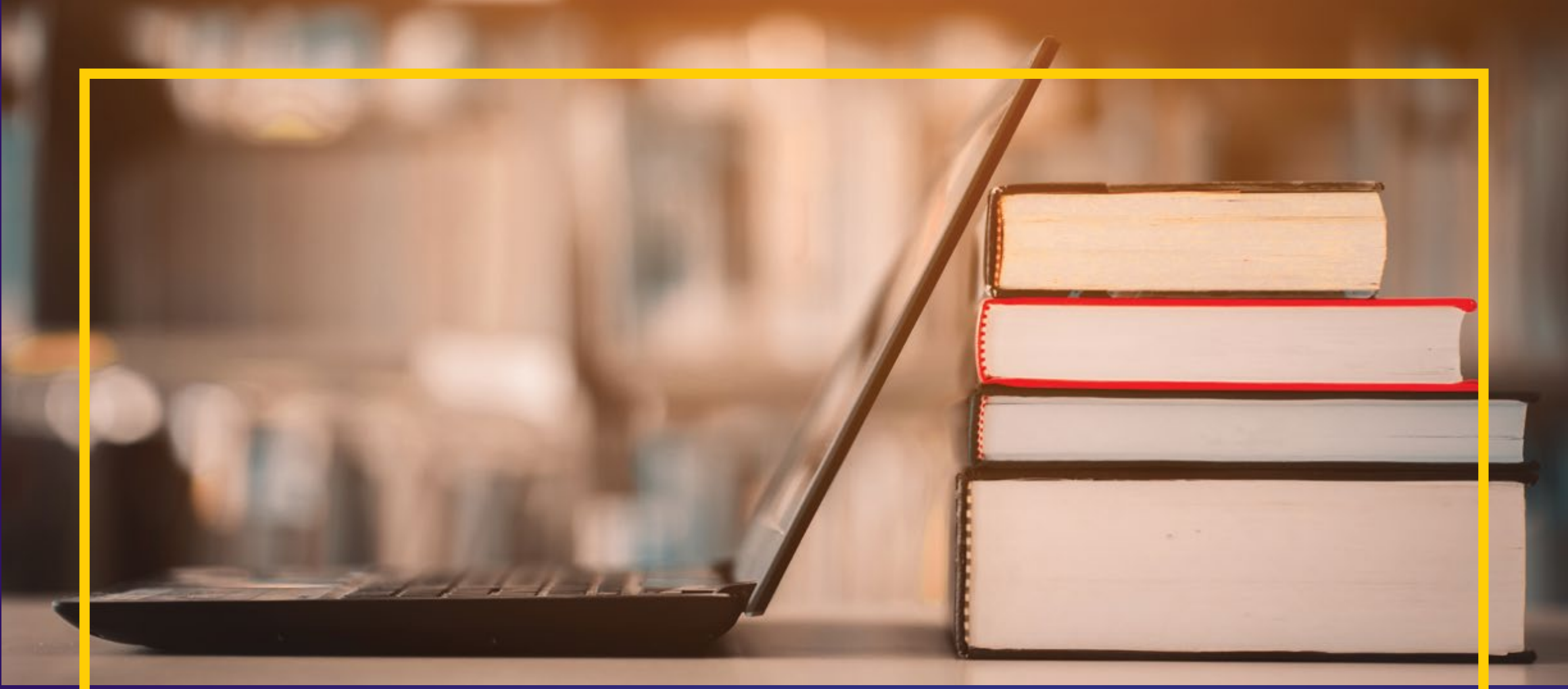
Tanzi mentions famine as a topic on disasters. He notes that famines can be due to poor distribution of income as some economic theories prevent income redistribution. In some cases, as in China and Russia, famines resulted from "extreme left experiments" (p. 73). Tanzi feels governments in the future should take a global approach as they work to eliminate famine.

In the climate change section, Tanzi concludes that "it may be a cruel illusion to believe that private actions, helped by some important technological changes, will, automatically and quickly, solve the ongoing global warming problem" (p. 164). He also notes it is easy to ignore climate change because it does not happen suddenly. While there is hope that spontaneous adaptation will help (p. 164), this is not enough. What is needed to address issues related to climate change and global warming would be global action and agreements through organizations such as the United Nations. What will help is a coordinated global effort getting away from the interests of individuals and specific groups (p. 165). What will help is a coordinated global effort getting away from the interests of individuals and specific groups (p. 165).

Tanzi also discusses inequality in the world. An example of inequality in the United States is how the top 1% of the wealthy saves 40% of their income; the bottom 90% saves almost none of their income; the remaining 9% (in between the top and bottom) saves

about 10% (p. 212). With these kinds of savings rates, Tanzi feels that the future will not hold less inequality (p. 212). To lower this inequality and address how those who are less wealthy can suffer more than the wealthy during a disaster, Tanzi has an idealistic vision of governments that include environmentalists and altruistic individuals (p. 219). These individuals would believe "as did some major thinkers in the 1950's (such as Einstein, Gandhi and Churchill), that we need an effective, *global*, institutional umbrella to guide decisions that affect the whole globe" (p. 219). Of course, only time will tell if we as human beings can implement such an idea and global approach. Tanzi's hope is that a global governmental role would help keep undesirable economic inequalities lower, as well as helping the world deal with unpredictable disasters, pandemics, and climate change.

Jeanette Evans
Jeanette Evans is an STC Associate Fellow; active in the Ohio STC community, currently serving on the newsletter committee; and co-author of an *Intercom* column on emerging technologies in education. She holds an MS in technical communication management from Mercer University and undergraduate degree in education.



CERTIFIED PROFESSIONAL

Technical Communicator

CPTC™

FOUNDATION

Project Planning
Project Analysis
Content Development
Organizational Design
Written Communication
Reviewing & Editing
Visual Communication
Content Management
Production & Delivery

CONTACT

For more information about certification and to start the process, visit *www.stc.org* or email *stc@stc.org.*

Certified Professional Technical Communicator™ (CPTC)

Advance your Career and the Profession Earn the CPTC Foundation Credential Today

The Certified Professional Technical Communicator (CPTC) credential assures employers, colleagues, and the public that you have the knowledge and skill to handle complex technical communication projects from the project planning stage through production and delivery.

Benefits

Why earn the CPTC credential? Because the CPTC credential:

- Distinguishes you from your peers;
- Shows you have the most up-to-date knowledge in the field;
- Opens up job opportunities and enhances job mobility;
- Elevates the profession;
- Gives you a sense of pride in your career; and
- Demonstrates your commitment to the field.

The CPTC credential gives you the edge you need to stand out to employers.

Continuing Education Requirements

Points may be obtained the following ways:

Event	Points
STC Annual Membership (any membership type for Foundation certificants)	2
STC Recorded Webinar (self-study)	1
STC Live Educational Webinar (free, sponsored, and community webinars excluded)	2
STC Online Courses	6
STC Summit Pre-Conference Courses (full day)	6
STC Summit Pre-Conference Courses (half day)	3
STC Annual Summit	8
Begin and complete a college-accredited course related to the Technical Communication field	8
Published articles that relate to any aspect of *Technical Communication* (2/article)	2
Published books publicly available on topics related to *Technical Communication* (5/book)	5
Presentations at conferences related to aspects of *Technical Communication* (2/presentation)	2
Total needed within 2 years post-certification date	**12**

Fees

Exam fees: STC Members $250, Non-Members, $495

Be a leader. ***Take your career to the next level by obtaining your credential. It's the most efficient way to prove your skills and knowledge in the technical communication field.***

Advance your Career and the Profession — Earn the CPTC Foundation Credential Today!
Learn more at www.stc.org/certification